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a. Write on one side of the paper only.

b. Write without breaks, *i. e.* do not begin a new sentence on a new line. When you want to begin a new line or paragraph at a given word, place before it in your MS. the sign ¶.

c. Draw a line along the margin of such paragraphs as should be printed in smaller type—for instance, all that is clinical history in reports of cases, etc.

d. Words to be printed in *italics*, should be underscored once, in SMALL CAPITALS twice, in LARGE CAPITALS three times.

4. Authors may receive proofs for revision if they will kindly return them without delay. We beg however to remind our contributors that changes in the copy are equivalent to resetting, causing so much additional expense. We therefore request them, to make, if possible, no alterations at all in their MSS., or, at least, to limit these to what is of essential importance

NOTICE TO OUR READERS.

The ARCHIVES OF OPHTHALMOLOGY contain *original papers* on all branches of ophthalmic surgery, and *original reports* on the progress of ophthalmology. The original papers occupy from two thirds to three fourths of the space, and their scope embraces all subjects of scientific and practical interest connected with this department of medicine.

The object of the ARCHIVES is to guard, solidify, extend, and diffuse the stock of acquired ophthalmic knowledge by recording the constant addition of new observations, investigations, methods and means of examination, clinical experience, instruments and remedies, and further by taking part in the discussion of the questions of the day with a spirit alike conservative and progressive.

Particular attention is paid to the preparation of the Report on the Progress of Ophthalmology. The report is intended to furnish a *complete, systematic, and early* review of the current ophthalmological literature of the world. It has been necessary to divide the work of its preparation among a number of collaborators according to the following arrangement :

Dr. H. MAGNUS, professor at the University of Breslau (22 Tauentzien Strasse) :

1. *General Ophthalmological Literature :*
   - *a.*—Text-books (not abstracts, but notes pointing out what is new and characteristic).
   - *b.*—Monographs and papers on historical, statistical, and general subjects ; reports on societies and hospitals.
   - *c.*—Periodicals on our specialty (short notices of their character, time and place of publication, the titles of the original papers, with the names of their authors).

2. *General Pathology, Diagnosis, and Therapeutics,* including new instruments, apparatus, and remedies.
3. *Normal Anatomy and Physiology,* including color-blindness.

Dr. C. HORSTMANN, lecturer at the University of Berlin (Potsdamer Strasse 4) :

1. *Anomalies of Refraction and Accommodation.*
2. *Eyelids.*
3. *Lachrymal Apparatus.*
4. *Muscles and Nerves.*
5. *Orbit and Adjacent Cavities.*
6. *Conjunctiva, Cornea, Sclerotic.*
7. *Injuries and Foreign Bodies of these parts.*

Dr. A. NIEDEN, of Bochum, Westphalia :

1. *Uveal Tract,* including glaucoma.
2. *Refracting Media,* including the lens.
3. *Retina and Optic Nerve.*
4. *Injuries and Foreign Bodies of these parts.*
5. *Ocular affections in connection with general diseases.*

In order to obtain complete and recent reviews on the non-German ophthalmological literature, special reporters have been selected for different countries, who will send monthly abstracts of all local ophthalmological publications to Dr. C. Horstmann, of Berlin, the editor of the Report. Dr. Horstmann will distribute these abstracts among the German reporters according to the above plan, in order to preserve the systematic arrangement, which we think of paramount importance.

The special reporters are :

For America : Dr. SWAN M. BURNETT, 1734 K Street, Washington, D. C.

For Great Britain and Ireland : Dr. C. E. FITZGERALD, 27 Upper Merrion Street, Dublin.

For France and Belgium: Drs. E. MARCKWORT, and P. VON MITTELSTÄDT, 10 Chaussée de Malines, Antwerp.

For Italy: Dr. DANTONE, Rome.

For Russia: Prof. HIRSCHMANN, of Charkow.

For Scandinavia: Drs. OLE BULL and SCHIÖTZ, Christiania.

In the interest of our readers, who are scattered over the whole world—and whom, like ourselves, we desire to keep informed of all advances in ophthalmology,—furthermore in their own interest, authors of ophthalmological works are requested to send reprints, duplicates of journals, or copies for reviewing, to one of the above-named reporters, or to the editors or publishers of the Archives, according to their convenience.

The abstracts of American ophthalmological literature formerly appeared under a special head, but are now embodied in the systematic Report. Text-books may be specially noticed.

The number of good papers offered us for publication has increased to such an extent that it is no longer possible to translate all of them unabridged. Whenever a German paper is condensed in the English version, or *vice versa*, it will be so stated. Should any one of our readers wish to recur to the original, the editors will always take pleasure in sending it for reference.

Under the heading of "Miscellaneous Notes," there will be published all kinds of professional news which specially concern the oculist, *e. g.*, appointments, honors, resignations, vacancies, new ophthalmic hospitals, opportunities for instruction, prize questions and essays, announcement of Society meetings, etc. Brief notices of this kind will be thankfully received by the editors.

Original papers of value from any source will, as heretofore, be welcome to the ARCHIVES, and are solicited.

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ARCHIVES OF OPHTHALMOLOGY.

REPORT ON A SECOND SERIES OF ONE HUNDRED SUCCESSIVE CATARACT EXTRACTIONS WITHOUT IRIDECTOMY.

By H. KNAPP.

AT the 7th Intern. Ophth. Congress held at Heid., in Aug., 1888, of 250 members, 5 only—Gayet, Schweigger, Wecker, Galezowski, and the present writer—warmly advocated extraction without iridectomy. It seems to me that it is time to base the discussion of this question on experience rather than on argument. Arguments may be strong or weak, but they are no demonstration. I beg leave, therefore, to communicate the result of my recent practice and to draw from it such conclusions as were more forced upon me than sought for.

In the March number of the 17th vol. of the ARCH. OF OPHTH., I published a report of the 1st series of 100 cases of extraction without iridectomy. Intercurrent with these operations were 17 extractions with iridectomy. My present remarks are based on 113 extractions, performed by me from Nov. 16, 1887, to Dec. 29, 1888, among which 100 were without, 13 with, iridectomy, *i. e.*, 1 with, to $7\frac{3}{4}$ without. I shall not speak here of the 13 cases, but may mention that there was neither a failure nor any thing unusual among them.

In the

Technique of the Operation

I desire to point out some changes:

1. In about 20 operations, I replaced Panas' solution for intraocular injection by a $\frac{1}{10000}$ *solution of bichloride of mercury*. When I injected only small quantities of this substance no reaction was noticed, whereas moderate quantities were followed by more or less transient opacity of the

cornea, affecting the posterior surface in irregular polygonal patches. In the case of a greatly collapsed eye, I injected a larger quantity; — the eye was lost by kerato-irido-choroiditis. Since that time I have abandoned the corrosive sublimate for intraocular injections and used Panas' solution, or more often a 3 per cent. boric acid solution. The liquid injected should be lukewarm, for in many cases the cold produces a sudden movement of the eye.

2. In about 25 cases I have opened the *anterior capsule with the narrow knife on its passage through the ant. chamber.* This is easy when the anterior surface of the lens is convex and the pupil by nature or by cocaine slightly dilated; but when the pupil is narrow, the point of the knife, dipping however superficially into the lens, causes the knife temporarily to change its straightforward direction, and may puncture and raise the opposite border of the iris. The knife has to be withdrawn until the iris is disengaged, and then rapidly passed through the ant. chamber. A correct section in this way is evidently more difficult than when the knife remains in its original plane. In the incident just described, the advantage of the narrow Gräfe knife is demonstrated better than on any other occasion:—collision with the iris and an undesirable counterpuncture can be easily corrected, and thus far I have not yet exsected a piece of iris in opening the capsule in this way. The method, we know, is old, but has of late been revived by Galezowski, Gayet, and others.

3. I want to recommend the *continuance of the upper section*, not only on account of its optical advantages, but also *on account of its offering better chances for preventing prolapse of iris and escape of vitreous.* When the eye looks down forcibly, the section gapes. I make it a rule, therefore, to avoid the downward position during the whole manipulation, but especially during the readjustment of the iris and the washing out of the anterior chamber, lest iris and vitreous fall into the gaping wound. I also caution the patient when he is bandaged not to look down to his feet, but to hold his eyes directed upward, in the natural position of repose during sleep.

Synopsis of the 100 cases operated on without iridectomy. (See pages 4–7.)

Accidents During the Operation:

Three cases of *escape of vitreous.*

1. Case 13. Traumatic cataract. Iris tilted; a portion of it became incarcerated in a corner of the wound, to which the galvano-cautery was applied. Recovery good. S $\frac{20}{200}$.

2. Case 57. An unmanageable patient. Iris reduced; pupil oblong. S $\frac{20}{60}$.

3. Case 84. The escape occurred in a myopic eye while I attempted to press out obstructions of the pupil. Iris reduced; found prolapsed on 4th day; was cut twice; smooth healing. Pupil clear; the capsule crowded aside by the vitreous. With + 11 + 16^{c} h S = $\frac{20}{30}$.

I have been very particular in cleansing the pupillary area; yet, in a few cases, a moderate quantity of REMNANTS was left. In none did this interfere with a smooth recovery, and good sight was obtained in all.

Anomalies of Healing Process.

1. One case of acute *mania*, disappearing in a day, after one eye had been left unbandaged.

2. On the fifth day, in one case, the non-operated eye contracted an intense (*epidemic*) *acute conjunctival catarrh*, with a good deal of discharge. Careful bandaging kept the inflammation from the operated eye.

3. *Death from apoplexy* in one case (No. 32) nine days after a normal extraction and undisturbed recovery.

4. In a case of hypermature cataract (No. 49) in a man of seventy, on the thirteenth day of a smooth recovery, the *nasal half of F became defective.* The defect—caused by an intraocular hemorrhage?—slowly disappeared in the course of three months. S = $\frac{20}{70}$,

5. *Posterior synechiæ* in many cases. All of them were only filiform, and did not materially obstruct the pupillary area, as in the iritides or irido-cyclitides of by-gone years.

6. *Spongy* (fibrinous, gelatinous) *exudation* occurred in two cases (7 and 79). Recovery good.

7. *Pupil slightly oval* in a few cases by iris puckered in the upper part of the sinus of anterior chamber. Sight good.

8. *Incarceration* of iris, *i. e.*, *anterior synechiæ*, in two cases. No disturbance.

No.	Name, Age, Health.	Cataract; Eye.	Operation, Healing, Duration of Treatment.	Primary S.	Secondary Operation after Extraction, Healing, Duration of Treatment.	Ultimate S.	Remarks.
1	John McC. 50. Good.	Ripe, complicated.	Nov. 16, 1887. Pupil slightly oval. 15 days.	10/200	Discission 4 weeks. 6 days.	20/40	Floating and diffuse opacities of vitreous.
2	Ida B. 83.	Hypermature, complicated.	Nov. 18th. 14 days.	20/100	Disc. 6 months. 6 days.	20/40	Rarefaction of choroid.
3	Mr. Mur. 70.	Ripe.	Nov. 25th. Restless. Acute mania two days. 16 days. Synechiæ.	20/200	Disc. 17 days. 5 days.	20/200	
4	Ph. Sher. 54.	Ripe.	Nov. 25th. Some synechiæ. 13 days.	20/70			
5	Mrs. V. G. 68.	Ripe.	Nov. 26th. Two filiform synechiæ. 14 days.	10/200	Disc. 16 days. 5 days.	20/70	
6	Hought. 57.	Ripe.	Nov. 27th. 14 days.	20/100			
7	Mrs. Rob. 60.	Ripe, complicated.	Nov. 29th. Spongy exudation. 21 days.	10/200 20/100		20/70	Opacities of vitreous.
8	Rey. 30.	Ripe.	Nov. 29th. 20 days.	20/200	Disc. 7 weeks. 8 days.	20/100	
9	Mrs. Bs. 75.	Ripe.	Dec. 1st. 15 dasy.	20/70	Disc. 3 months. 6 days.	20/40	
10	Mrs. H. 57.	Ripe.	Dec. 3d. 17 days.	20/70	Disc. 2 months. 4 days.	20/40	
11	Mrs. B. 59.	Ripe.	Dec. 5th. 15 days.	10/100	Disc. 6 weeks. 12 days.	20/40	
12	Ed. M. 47.	Immature. (Nuclear sclerosis.)	Dec. 5th. 12 days.	20/70	Disc. 13 days. 4 days.	20/40	
13	Meek. 39.	Traumatic.	Dec. 10th. Escape of *vitreous*. Iris tilted back. *Incarceration* in corner burnt off with galvano-cautery. 23 days.	20/200			
14	Od. 40.	Hypermature.	Jan. 3, 1888. Incarceration. 14 days.	20/70			
15	Kittr. 66.	Ripe.	Jan. 4th. 13 days.	20/40	Disc. 26 days. 6 days.	20/30	
16	Frank. 47.	Ripe, complicated.	Jan. 14th. 16 days.	20/100	Disc. 32 days.	20/70	Mac. corneæ. Pupil entirely clear.
17	Miss C. 28.	Traumatic.	Jan. 14th. Remnants. 19 days.	1/∞	Disc. 4 weeks. 5 days.	20/30	
18	Wells. 75.	Hypemature.	Jan. 26th. Ant. capsule removed with forceps. *Prolapse* on 4th day; cut on 6th. 23 days.	20/100	Disc. 23 days. 5 days.	20/40	No irritation. Restless patient; gipsy.
19	Hartw. 63.	Ripe.	Jan. 28th. 16 days.	20/70	Disc. 6 weeks. Puncture in cornea yellowish, a thread hanging out of it; cut. Inflammation for 6 weeks. 3 weeks.	20/40	Circumcorneal injection, pain, congestion of iris, vitreous hazy. Finally perfect clearing, sight good, no later discomfort.
20	Wells. 75.	Ripe. Chr. conjunctivitis.	Feb. 10th. 14 days. Swelling of lid. Mucous discharge. Healing good.	20/100	Disc. 3 weeks. 6 days.	20/40	In 6 days.
21	M. Con. 50.	Ripe.	Feb. 11th. 17 days.	20/40	Disc. 4 mos. 5 days.	20/40	In 2 months.
22	M. Cosch. 69.	Ripe.	Feb. 14th. 19 days.	20/70			
23	Cath G. 50.	Hypermat.	Feb. 17th. 14 days.	20/40	Disc. 7 weeks. 5 days.	20/30	In 3 weeks.
24	Mrs. Sh. 64.	Ripe.	Feb. 17th. 18 days.	20/50	Disc. 6 weeks. 4 days.	20/30	In 4 days.
25	Th. H. 54.	Ripe.	Feb. 24th. 17 days.	20/70	Disc. 7 weeks. 5 days.	20/50	In 3 months.
26	J. O'R. 69.	Ripe.	March 2d. 13 days.	20/40	Disc. 26 days. 5 days.	20/40	9 months.
27	M. F. 67.	Ripe.	March 2d. 15 days.	20/40	Disc. 6 weeks. 5 days.	20/40	In 3 months.

25	Th. H. 54.	Ripe.	Feb. 24th. 17 days.	$\frac{20}{70}$	Disc. 7 weeks. 5 days.	$\frac{20}{70}$
26	J. O'R. 69.	Ripe.	March 2d. 13 days.	$\frac{20}{70}$	Disc. 26 days. 5 days.	$\frac{20}{40}$ 9 months.
27	M. F. 67.	Ripe.	March 2d. 15 days.	$\frac{20}{50}$	Disc. 15 days.	$\frac{20}{30}$ 2 months.
28	Ch. Ren. 71.	Ripe.	March 2d. 14 days.	$\frac{20}{100}$	Disc. 4 weeks. 4 days.	$\frac{20}{40}$ In 4 days. $\frac{20}{200}$ In 11 months.
29	Eust. 43.	Ripe.	March 30th. 15 days.	$\frac{20}{40}$	Disc. 4 weeks. 3 days.	$\frac{20}{30}$ In 7 days.
30	Giov. 64. Brightic.	Ripe.	April 6th. *Prolapse* of iris; cut. Iritis plastic. 42 days.	$\frac{10}{200}$		
31	J. St. 76.	Hypermat. Iris atrophic.	April 10th. Eczema palpebr. Small *prolapse* of iris; cut on 14th day. 29 days.	$\frac{20}{200}$	Disc. 7 weeks. 5 days.	$\frac{20}{70}$ In 5 days.
32	A. Kn. 55.	Accreta.	April 10th. No reaction. Died of apoplexy on ninth day.	$\frac{20}{40}$ estimated.		Condition of eye perfect.
33	C. K. 64.	Complicated.	April 11th. 19 days.	$\frac{20}{70}$	Disc. 2 mos. 5 days.	$\frac{20}{40}$ Od. pale.
34	Cant. 56.	Ripe.	April 11th. 13 days.	$\frac{20}{50}$	Disc. 1 month. 3 days.	$\frac{20}{30}$ In 4 weeks.
35	S. Degh. 65.	Ripe.	April 11th. 12 days.	$\frac{20}{50}$	Disc. 1 month. 5 days.	$\frac{20}{30}$ In 4 weeks.
36	Breit. 64.	Ripe.	April 14th. 14 days.	$\frac{20}{50}$	Disc. 1 month. 5 days.	$\frac{20}{30}$ In 5 days. $\frac{20}{15}$ In 3 days.
37	Fr. Hem. 45.	Milky.	April 16th. Puriform discharge. Wound healed well. Remnants in pupil. 14 days.	$\frac{20}{200}$	Disc. 5 weeks. 8 days.	$\frac{20}{70}$ Cultivation from discharge. Vigorous growth of staphylococ. pyogenes.
38	Davis. 64.	Ripe.	April 19th. Blood and remnants. Slight iritis. Pupil distorted. No relapse. 23 days.	$\frac{20}{200}$	Disc. 23 days. 4 days.	$\frac{20}{50}$ In 4 days.
39	Kittr. 66.	Ripe.	April 26th. 12 days.	$\frac{20}{50}$	Disc. 27 days. 4 days.	$\frac{20}{30}$
40	Mrs. Bass. 58.	Hypermat.	April 26th. Capsule extracted with forceps. "Breech delivery" 4th day; pupil central. Next night restless, hurt eye. 5th day, small *prolapse*. 14 days.	$\frac{20}{200}$	In two months, *prolapse*, which had become swollen (cystoid), *abscised*. Healing smooth. 5 days.	$\frac{20}{40}$ In 3 months, with $+\frac{1}{12}\frac{1}{2}+\frac{1}{18}$ ax. Normal.
41	Mrs. Osw. 60.	Ripe.	April 26th. 18 days.	$\frac{20}{50}$	Disc. 4 weeks. 4 days.	$\frac{20}{30}$
42	N. Lup.	Morgagn.	May 1st. 14 days.	$\frac{20}{50}$	Disc. 4 weeks. 5 days.	$\frac{20}{30}$
43	Sturz. 77.	Ripe.	May 2d. 16 days.	$\frac{20}{100}$	Disc. 23 days. 5 days.	$\frac{20}{50}$ In 10 days.
44	Bartur. 62.	Ripe.	May 4th. 13 days.	$\frac{20}{70}$	Disc. 6 weeks. 5 days.	$\frac{20}{30}$
45	J. F. 59.	Ripe.	May 7th. 13 days.	$\frac{10}{70}$	Disc. 3 weeks. 5 days.	$\frac{20}{30}$ In 5 days. $\frac{20}{40}$ In 29 days.
46	G. Marshall. 69.	Ripe.	May 8th. Eye collapsed; a considerable quantity of corros. subl., 1 : 10,000, injected into ant. chamber. Striped and diffuse keratitis. Pupillary membrane. 22 days.	$\frac{3}{200}$	7 weeks. Closing of pupil; *iridectomy*, with Tyrell's hook. Pupil closed again.	$\frac{1}{8}$ Failure by keratitis and irido-choroiditis, probably in consequence of too much corros. subl. being injected.
47	R. H. 52.	Ripe.	May 8th. 11 days. Corros. subl. injected.	$\frac{20}{200}$	Disc. 3 weeks. 5 days.	$\frac{20}{100}$ In 5 days. Cornea still hazy.
48	Gleason. 42.	Ripe.	May 8th. 26 days. Corros. subl.	$\frac{20}{200}$		Cornea still hazy when last seen, 5 weeks after extraction.
49	H Liv. 70.	Nigra.	May 9th. No reaction. On 14th day, T_1; cornea wrinkled; F contracted on nasal side. 18 days.	$\frac{1}{200}$		$\frac{20}{70}$ with $+\frac{1}{2}$ J_1. Eye gradually assumed normal tension. F defect disappeared in 6 weeks.

No.	Name, Age, Health.	Cataract ; Eye.	Operation, Healing, Duration of Treatment.	Primary S.	Secondary Operation after Extraction, Healing, Duration of Treatment.	Ultimate S.	Remarks.
50	Mrs. DeC. 66.	Ripe.	May 10th. 14 days.	20/40	Disc. 3 weeks. 5 days.	20/20	Five days after the extr. the other eye developed acute conjunctival catarrh. The operated eye, kept carefully bandaged, did not catch it.
51	Mrs. Ho. 53.	Ripe.	May 11th. 24 days.	20/70	Disc. 33 days. 5 days.	20/20	In 5 days.
52	Miss H. 37.	Compl.	May 11th. 14 days.	20/70	Disc. 27 days. 5 days.	20/70	Opacities of vitreous.
53	Mrs. T. 66.	Compl.	May 14th. 14 days.	20/50	Disc. 3 weeks. 5 days.	20/20	In 10 days.
54	M. Sm.	Compl.	May 17th. 13 days.	1/100	Disc. 5 weeks. 5 days.	20/20	In 5 days.
55	Barn.	Compl.	May 19th. 19 days.	20/70	Disc. 15 days. 5 days.	20/20	In 6 weeks.
56	Allen.	Compl.	May 19th. 13 days.	20/50	Disc. 4 weeks. 5 days.	20/20	
57	C. Bergn.	Compl., m. and opacities of vitreous.	May 20th. *Prolapse* of *vitreous*. Iris reduced. Pupil oblong.	1/200		1/50	Unmanageable patient.
58	Cath. W. 58.	Ripe.	May 21st. 15 days.	20/70	Disc. 18 days. 6 days.	20/20	
59	Tusca. 39.	Soft.	May 24th. Thickened capsule extracted. 13 days.	20/70	Disc. 3 weeks. 4 days.	20/20	In 4 days. In 2 weeks.
60	Conn. 65.	Ripe.	May 30th. Capsule extracted. 14 days.	20/40	Post. capsule dull. Disc. 3 weeks. 5 days.	20/50	
61	Mrs. Kr. 68.	Ripe.	June 6th. Some adhesions. 14 days.	20/200	Disc. 4 weeks. 5 days.	20/50	Vitreous hazy.
62	Mrs. S. 70.	Ripe.	June 6th. 14 days.	20/30	In six months S. had fallen to 20/70. Disc. 5 days.	20/50	
63	Mrs. C. 55.	Morg.	June 7th. 14 days.	20/40			
64	M. Ger. 27.	Soft, cholesterinic.	June 7th. 12 days.	20/200	Disc. 18 days. 4 days.	20/70	In 4 days.
65	M. Ochs. 56.	Ripe.	June 8th. Remnants. 16 days.	1/200	Disc. 16 days. 4 days.	20/200	
66	H. Harris. 84.	Ripe.	June 15th. 12 days.	1/100	Disc. 12 days. 4 days.	20/40	
67	M. Cr. 60.	Ripe.	Oct. 3d. 14 days.	20/200	Disc. 3 weeks. 5 days.	20/50	
68	McK.	Soft, traum.	Oct. 3d. 14 days.	20/50	Disc. 24 days. 4 days.	20/50	Chr. conjunct. catarrh.
69	Cath. B. 58.	Ripe.	Oct. 5th. 14 days.	20/70			Chr. conjunct. catarrh.
70	I. St. 28.	Soft.	Oct. 6th. 14 days.	20/50	Disc. 23 days. 5 days.	20/50	In 10 days.
71	Dr. Sale. 81.	Ripe.	Oct. 10th. 18 days.	20/50	Disc. 4 months. 4 days.	20/50	In 5 days.
72	Mrs. Sch. 80.	Ripe.	Oct. 10th. 15 days.	20/200	Disc. 16 days. 5 days.	20/50	In 4 months.
73	G. D. W. 79.	Ripe.	Oct. 12th, 12 days.	20/70	Disc. 12 days. 5 days.	20/100	
74	Indig. 65.	Complicated.	Oct. 12th. 13 days.	20/100	Disc. 4 weeks.	20/50	Homonymous hemianopsia from previous apoplexy.
75	El. Fox. 70.	Ripe.	Oct. 13th. 13 days.	20/70	Disc. 16 days. 10 days.	20/40	
76	E. Hay. 77.	Complicated.	Oct. 17th. 14 days.	20/200	Disc. 14 days. 5 days.	20/200	Eye weak before cataract developed.
77	Mrs. R. 65.	Ripe.	Oct. 19th. 13 days.	20/50	In a month 20/40. Disc. 1 month. 5 days.	20/50	
78	Terk. 72.	Ripe, complicated.	Oct. 24th. 14 days.	20/100	Disc. 15 days. 9 days.	20/40	Floating opacities of vitreous. They had been seen before the cataract

78	Terk. 72.	Ripe, complicated.	Oct. 24th. 14 days.	20/100	Disc. 15 days. 9 days.	20/40	Floating opacities of vitreous. They had been seen before the cataract developed.
79	A. Tell. 74. Restless, eccentric.	Ripe.	Oct. 26th. Spongy exudation. 16 days.	20/200			
80	L. Hen. 42.	Ripe.	Oct. 26th. 12 days.	20/100	Disc. 4 weeks. 5 days.	20/40	Had ozæna and ulcus cruris.
81	M. O. 56.	Ripe.	Nov. 2d. 13 days.	20/100			
82	M. Touz. 65.	Ripe.	Nov. 3d. 18 days.	20/100	Disc. 18 days. 6 days.	20/50	
83	Morse. 75.	Ripe.	Nov. 7th. 14 days.	20/70	Disc. 23 days. 5 days.	20/40	In 10 days.
84	Ho. 75.	Ripe. M.	Nov. 7th. *Vitreous* escaped while remnants were pressed out. Iris reduced. No reaction. 3d day, *prolapse of iris.* Cut on 5th and 9th day. Healing smooth. Pupil excentric, perfectly unobstructed (capsule pushed sideways by vitreous). 18 days.	20/70		20/30	With + 17 + 16ch. Reads, day and night, with + 5 + 16ch. Pupil and fundus perfectly clear. No discomfort.
85	M. L. 43.	Ripe.	Nov. 12th. 13 days.	20/70	Disc. 3 weeks. 5 days.	20/20	In 5 days.
						20/30	In 5 weeks.
86	Mrs. Pf. 51.	Ripe.	Nov. 12th. 13 days.	20/60	Disc. 32 days.	20/30	In 5 days.
						20/60	In 4 weeks.
87	O. Bc. 46.	Cat. accreta.	Nov. 14th. After expulsion of lens, a bead of *vitreous escaped.* Iris reduced. Pupil excentric. 14 days.	20/60		20/40	In a month. Had albuminuria and casts.
88	Mrs. C. 69.	Ripe.	Nov. 16th. 18 days.	20/100	Disc. 1½ minutes.	20/30	In 6 days.
89	Mrs. Tort. 62.	Ripe.	Nov. 16th. 11 days.	20/70	Disc. 19 days. 5 days.	20/30	In 12 days.
90	Mrs. Z. 68.	Morg.	Nov. 28th. 14 days.	20/100	Disc. 14 days. 6 days.	20/70	In 6 days.
91	Cath. L. 47.	Ripe.	Nov. 28th. 20 days.	10/200			Has always had poor sight and strab. conv. in that eye.
92	T. Donoh. 76.	R. Ripe.	Dec. 5th. 14 days.	20/70			
93	"	L. Ripe.	Dec. 19th. 15 days.	20/70		20/40	
94	Mrs. C. 50.	Ripe.	Dec. 5th. 14 days.	20/100			
95	Mrs. Bart. 62.	Ripe.	Dec. 10th. 13 days.	20/100	Disc. 2 minutes. 3 days.	20/40	In 3 days.
96	Mrs. Cun. 60. Ozæna.	Ripe.	Dec. 12th. 17 days.	20/200			
97	C. Caldw. 67.	Ripe.	Dec. 21st. Eye excellent until 11th day, when he hurt eye with his fist. Free *escape of vitreous.* Iris tilted back. Healing good, but with excentric pupil. 20 days.	20/100		20/20	In 5 weeks.
98	R. Curtis. 59. Diabetes.	Ripe.	Dec. 27th. 11 days.	20/70	Disc. 33 days. 4 days.	20/20	
99	P. H. W. 43.	Nuclear sclerosis.	Dec. 29th. 13 days.	20/30			
100	J. Blum.	Ripe.	Dec. 29th, 1888. 17 days.	20/200	Disc. 3 weeks. 5 days.	20/20	

9. Six cases of PROLAPSE OF IRIS.

In the *first* (No. 18), patient restless; prolapse cut. S = $\frac{20}{40}$.

In the *second* (No. 30), the prolapse was cut on the fourteenth day. Plastic iritis. S only $\frac{10}{200}$. Patient in an advanced stage of Bright's disease.

In the *third* (No. 31), the prolapse was small; cut on the fourteenth day. S = $\frac{20}{70}$. The cataract was hypermature, and the iris atrophic. Patient, æt. seventy-six, had eczema palpebrarum.

In the *fourth* (No. 40), the thickened capsule of a hypermature cataract had been extracted. Pupil round on fourth day. Eye hurt during fourth night. Prolapse small; became swollen and cystoid in two months; abscised; healing without reaction. S = $\frac{20}{40}$.

In the *fifth* (No. 46), an inordinate quantity of corr. subl. ($\frac{1}{10000}$) had been injected, causing pain the whole night. Eye lost from irido-cyclitis (see above).

In the *sixth* (No. 84), a man of seventy-five, prolapse of vitreous had previously occurred during the operation; the prolapsed iris was pushed back; cut twice. S = $\frac{20}{80}$ (see above).

In my first series of 100 extractions without iridectomy prolapse of iris occurred in twelve cases; in the present, where it occurred in six cases, five were among the first fifty, one in the second fifty cases of the series. Great care in operating, crowding out, *i. e.*, reserving for iridectomy, the unpromising cases (atrophy of iris, fluidity and prolapse of vitreous, restless and unmanageable patients), may reduce the number of cases of prolapse still more. I feel convinced, from recent observations, that secondary prolapse of the iris, just as secondary hemorrhage into the anterior chamber, is of traumatic origin in almost all cases, if not in every one. Its prevention depends on careful nursing. To have the patient's hands tied from the third day on is a wise precaution, lest, in sleep, he should unconsciously hurt the itching eye. In two cases of the present series the accidental omission of this precaution was followed by a rupture of the wound, in others by a partial separation of the edges of the wound, causing hyphema, but no prolapse. Surely, by observing all these rules, prolapse, this justly dreaded complication

of simple extraction, can be confined to exceptional cases; yet I dare not entertain the hope ever to rival Galezowski, who, in the last 200 operations, had prolapse of the iris in one case only.[1] He thinks that the prolapse is mostly produced through premature opening of the eye by the surgeon. Since he began leaving the eye closed during the first six days, he has had no more hernias.

Among the present series of 100 cases the

Cataract was complicated

in the following 13:

1. In five (Nos. 1, 7, 53, 57, 78) with *opacities of the vitreous*, producing spongy exudation in one (7), and escape of vitreous in another (57). S in these cases was $\frac{20}{40}$, $\frac{20}{70}$, $\frac{20}{70}$, $\frac{20}{50}$, $\frac{20}{40}$.
2. *Rarefaction of choroid*, 1 case (No. 2), S $\frac{20}{40}$.
3. *Mac. corneæ*, 1 case (No. 16), S $\frac{20}{70}$.
4. *Atrophy of iris*, 1 case (No. 31); iris prolapsed, S $\frac{20}{70}$.
5. *Post. Synechiæ*, 2 cases (Nos. 32 and 87), S $\frac{20}{40}$ in both.
6. *Formation of cholesterine*, 1 case (No. 64), S $\frac{20}{70}$.
7. *Hemianopsia* from cerebral apoplexy, 1 case (No. 74), S $\frac{20}{60}$.
8. *Previous amblyopia*, 1 case (No. 76), S $\frac{20}{40}$.
9. *Inordinate myopia*, 1 case (No. 84). Escape of vitreous and prol. of iris occurred, S $\frac{20}{30}$.
10. Former *strabismus convergens*, 1 case (No. 91), S $\frac{10}{200}$.

Visual Results.

A. Primary vision—*i. e.* on the day of discharge.	Ultimate vision.
$\frac{20}{30}$ in 6 cases.	$\frac{20}{30}$ in 30 cases.
$\frac{20}{40}$ " 7 "	$\frac{20}{30}$ " 10 "
$\frac{20}{60}$ " 12 "	$\frac{20}{40}$ " 18 "
$\frac{20}{70}$ " 30 "	$\frac{20}{50}$ " 15 "
$\frac{20}{100}$ " 19 "	$\frac{20}{70}$ " 13 "
$\frac{20}{200}$ " 17 "	$\frac{20}{100}$ " 5 "
$\frac{15}{200}$ " 1 case	$\frac{20}{200}$ " 6 "
$\frac{10}{200}$ " 5 cases	$\frac{10}{200}$ " 2 "
$\frac{8}{200}$ " 1 case	
$\frac{1}{200}$ " 1 "	
$\frac{1}{\infty}$ " 1 "	$\frac{1}{\infty}$ " 1 case

[1] Bericht des 7ten Int. ophth. Congr., p. 156.

Expressing this in the customary manner, we have

Primary S.	Ultimate S.
Good in 91 %	97 %
Moderate in 8 %	2 %
Failure in 1 %	1 %

If we consider the primary and the ultimate vision, we find the difference enormous. In the first column there is not one case with S $\frac{20}{10}$; in the second there are 30 cases; moderate results have been reduced from 8 % to 2 %. If we consider the (ideal) possible maximum to be $\frac{20}{10}$ in all cases, and calculate how much the column of primary and that of secondary vision fall short of this result, we obtain in primary S a deficiency of 74 %; in the secondary S a deficiency of 43 % (fractions omitted), a gain of 31 %. The cause of this gain was the

Subsequent discission of the capsule

which was done in seventy-four cases. This general gain was obtained without the destruction or even deterioration of a single eye. In several cases some inflammation (cyclitis, with diffuse opacities of the vitreous) followed, and took several weeks to disappear, but no eye was injured, *i. e.*, had its previous vision rendered worse. I cannot, therefore, concur in the widespread dread of the division of secondary cataract, which Gayet eloquently words[1] as follows: "En ce qui me concerne, il n'est pas d'opération que je redoute davantage; elle me paroit toujours incertaine, souvent inutile, parfois très-dangereuse." I know that this operation is delicate, requires precaution, judgment (passing the knife-needle through the places of least resistance, and avoiding unyielding cords), good artificial light, perfect sight (a hyperopic or presbyopic operator ought to make himself myopic by a strong glass), and a sharp knife-needle which retains the aqueous. The after-operations in the present series are a new confirmation of what, in former reports, I have stated over and over again, and the synopsis under consideration furnishes the evidence in each case

[1] Bericht des of 7ten Intern. ophth. Cong., p. 133; last line.

for any one who will take the trouble to examine the series. The column of ultimate vision does not sufficiently express the real gain in S, for very many entries were made on the day the patients were discharged, commonly the fifth after the discission. At this time, there is usually still some turbidity of the vitreous, which clears up later, as is illustrated in the synopsis by all the cases of which later examinations could be made. Returning to the mathematical expression of the acuteness of sight obtained, we find that, at the day of discharge, the patients lacked 74 % of the possible maximum, they possessed only 26 %, *i. e.*, on an average they received only $S = \frac{26}{100}$, or $\frac{1}{4}$ of the normal standard; whereas the column of ultimate vision, *i. e.*, after the discission of the capsule, shows that they possessed 57 %, *i. e.*, $S = \frac{57}{100}$, or almost $\frac{3}{5}$ of the normal standard, their S ranging between $\frac{20}{30}$ and $\frac{20}{40}$. If we bear in mind that a number of cataractous eyes are more or less diseased, and, apart from the cataract, would have diminished visual acuteness, the above result seems remarkably gratifying, pleading the cause of the operative method more forcibly than the most plausible arguments of the severest critic.

If I review my cases, the opinion is forced upon me that *the simple extraction is not only the best but also the safest method of removing cataract.* The iris, spread out as a *velum interpositum* between the corneal section and ciliary body, protects this, the most susceptible part of the eye, from the deleterious substances that may enter through the wound.

ISOLATED RUPTURE OF IRIS AND CHOROID BY A REBOUNDING RIFLE BALL.

By C. F. CLARK, of Columbus, O.

(*With one wood-cut.*)

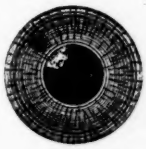
THE following unique case raises a curious question as to the possibilities in injuries of the iris:

On January 21, 1889, Mr. B., of Derby, Ohio, was brought to me by his physician, Dr. Smith, for consultation. He gave the following history: On January 8th, while at rifle practice, firing at an oak post some forty feet away, the ball rebounded and struck him in the left eye, after which he heard it fall to the ground. The gun was an old-style, muzzle-loading rifle, and he was using a round ball a little larger than a twenty-two calibre. The ball being much smaller than the bore of the gun, he was obliged to use a "patch" of considerable thickness about it, and this probably accounted for the reduced speed and rendered such a rebound possible. There was considerable pain in the eye, and his house adjoining that of the doctor, he consulted him about five minutes after he was struck. Upon examination, the doctor found that the skin of the lower part of the upper lid of the left eye was contused at a point a short distance to the nasal side of its centre; there was already great redness and swelling, but no laceration and no ecchymosis then or later. The cornea was found to be intact, the upper half of the aqueous and pupil clear, and nothing abnormal was observed at that time in the upper half of the iris, but the lower half of the anterior chamber was filled with blood. Cocaine and atropine were instilled, and under their influence the pain subsided, and in three hours' time the blood in the anterior chamber was absorbed. For two or three days it was found necessary to continue the instillation of cocaine and atropine to control the pain which appeared occasionally, but later

on no treatment was applied, and vision, which had been greatly reduced, improved somewhat.

On his reporting to me, thirteen days after the injury, I found the following condition: General appearance of the eye good, with the exception of a slightly dilated and sluggish pupil. A somewhat thickened appearance of the lid was noticeable, but this the patient attributed to a sty which had scarcely healed at the time of the injury. The cornea was clear and transparent. A small black spot was noticed in the superior nasal quadrant of the iris about 1 *mm* from the pupillary margin; but, in the general inspection, and before bringing to bear on it condensed light or the use of the ophthalmoscope, it was considered to be one of the spots of marked pigmentation so often seen in the normal iris.

A more minute examination revealed slight trembling of the iris at the nasal side, a very slightly faded appearance of its surface as compared with that of the other eye, and the "pigment spot" proved to be a perforation about 1½ *mm* long by 1 *mm* wide, presenting the appearance of a laceration, thus:



with a web-like membrane covering its upper portion, but not noticeable except by close inspection. By focal illumination it was also seen that in the superior nasal quadrant of the lens, opposite the point which would have been occupied by the perforation had the pupil been contracted, there was a delicate opacity of the lens.

On testing the visual acuteness, I found it as follows:

Vision $\begin{cases} \text{O. D. } \frac{4}{4} + 1^{s} = \frac{4}{4}. \\ \text{O. S. } \frac{4}{5} + 1^{s} = \frac{4}{4}, \text{ slightly better with the glass.} \end{cases}$

Range $\begin{cases} \text{O. D} + 1^{s} = \text{J. } 1 \text{ @ } 5'' - 26''. \\ \text{O. S.} + 1^{s} = \text{J. } 10 \text{ @ } 10'' - 38'' \mid + 3^{s} = \text{J. } 2 \text{ @ } 8'' - 12''. \end{cases}$

With the left eye the distant vision, and to a greater degree the near vision recorded above, was only obtained after steady gazing, showing the reduction of the accommodative power by the partial opacity of the lens, and possibly also by a degree of paresis of the ciliary muscle, though with the trembling iris and the beginning opacity of the lens at one point only, it is difficult

to see why some lenticular astigmatism should not have been detected.

By means of the ophthalmoscope the clear, red reflex of the fundus was to be seen as a small, circular spot through the lower portion of the perforation. With the exception of the web-like opacity of the lens, spoken of above, the media were found to be clear. The disc was normal in color and outline, with a central, circular physiological cup from which the normal vessels emerged. At about one and one half disc diameters above the disc, and extending two to two and one half diameters towards the temporal side in a line approximately parallel with the margin of the disc, was seen a broad, whitish line, evidently in the choroid, and such as to suggest a recent partial rupture of that tunic, but there were no indications of hemorrhage and no accumulations of pigment. The retinal vessels passed over it uninterrupted in their course. No evidence of disturbance of the vitreous could be discovered.

We here have the presence of blood in the anterior chamber, perforation of the iris, and slight opacity with partial rupture of the suspensory ligament of the lens at the point corresponding with a blow on the lid inflicted by a rebounding rifle-ball. And, if the whitish line in the choroid may be so interpreted, we have in addition rupture of that tunic.

It might well be doubted whether it were possible for a missile inflicting so trifling a wound on the lid, and making no observable impression on the cornea, to so contuse the iris as to cause a perforation by compressing its tissues against the lens. But there was no ecchymosis in the episcleral tissue to indicate that the force of the blow was expended on the ciliary zone above, and no other source for the hemorrhage could be discovered in the anterior chamber.

The coincidence of such a perforation, due to some other cause, chancing to lie exactly in the line of the bullet's course, would, indeed, be remarkable, and even harder to accept than the conclusion that a perforation may be produced by compression of the fibres of the iris between the cornea and lens, with no perceptible lesion of the cornea and only slight local opacity of the lens.

A CASE OF SARCOMA OF THE IRIS.[1]

By DAVID WEBSTER, M.D., and IRA VAN GIESON, M.D.,
New York.

(*With a drawing.*)

Clinical history (Dr. Webster). *Nov.* 1, 1888.—Miss Annie M., æt. sixty, Canadian, cook, states that up to four weeks ago she was not conscious of any trouble with either of her eyes. On the evening of *Oct. 4th*, while reading, she noticed what seemed to be a strand of hair between the page and her left eye. She could not brush the hair away, and this was the first intimation she had of any thing being wrong with the eye. Soon after a purple mist appeared before the left eye. The sight varies, being much worse at times. There is no family history of cancer. R V = $\frac{20}{40}$; $\frac{20}{20}$ with + 1.50 D. L V = $\frac{20}{50}$; not improved by any glass.

The left pupil is widely dilated, except infero-temporally, where there is a tumor of the iris as large as a small pea. The smooth anterior surface of the iris covering the neoplasm is pressed forward by the latter, so as to be nearly in contact with the cornea. The tumor seems to extend to the ciliary region, and its roughly pigmented posterior surface bulges backward against the lens capsule. The tension of the eyeball is considerably increased (+ 2).

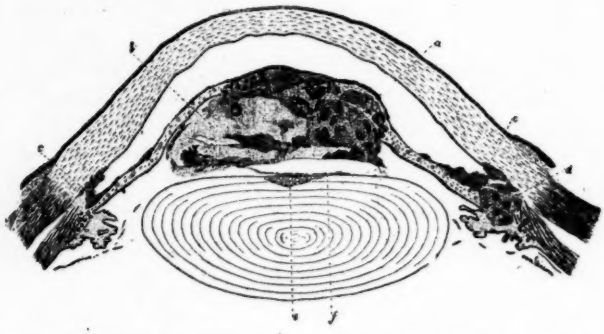
Ophthalmoscopic examination reveals strong pulsation of the retinal arteries, but no glaucomatous cupping of the optic disc.

Nov. 5th.—L V = $\frac{20}{70}$; not improved with glasses. Enucleation under ether. *Nov. 9th.*—There has been some ecchymosis of the lids, but no inflammatory reaction. *Nov. 19th.*—Has been wearing an artificial eye for the last two days, and returned to her home.

Microscopical examination (Dr. van Gieson).—A peduncu-

[1] Read before the Ophthalmic Section of the New York Academy of Medicine, March 18, 1889.

lated, mottled, light- and dark-colored, ellipsoidal nodule ($4 \times 3 \times 3$ *mm* in diameter), attached to the posterior surface of the iris by a broad base, is situated at one side of the pupil, encroaching very slightly into its area. The anterior surface of the iris is bulged forward by the nodule to within one half a *mm* of Descemet's membrane. The posterior surface of the tumor has shrunken away from the anterior lens capsule in the hardening process, so that, in sections, an artificial crack appears between the lens and the tumor (see drawing).



SECTION THROUGH THE ANTERIOR CHAMBER INCLUDING THE TUMOR.

a. Portion of the tumor fused with the body of the iris, consisting of small spindle cells associated with a small quantity of pigment.

b. Portion of the tumor composed almost entirely of pigment granules lying in a stroma containing a very few spindle cells.

c, *c*. Layer of tumor cells covering the anterior surface of the iris, filling up the angle of the anterior chamber.

d. Group of tumor cells replacing the root of the iris and a small portion of the ciliary body.

e. Anterior polar cataract.

f. Layer of cells, corresponding to the posterior border of the tumor, sticking to the anterior lens capsule.

The tumor consists of two portions. One portion (drawing, *a*) is made up of closely packed, small spindle-shaped cells, some of which are pigmented, lying in a sparingly pigmented basement substance. This portion is fused with the iris and replaces a portion of its substance. The other portion (*b*) (a little more than one half of the tumor) consists almost exclusively of different-sized pigment granules, lying in a scanty, delicately fibrillated stroma.

The anterior surface of the iris in the tumor region is covered with a layer of pigmented spindle cells, which extend from the tumor in irregular nodular masses to the periphery of the iris on either side. The body of the iris between the tumor and the ciliary extremity is normal, and the layer of tumor cells on the anterior surface does not extend into its substance. At the ciliary border of the iris on either side this layer is very much thicker. It fills up the angle of the anterior chamber, infiltrates the meshes of the ligamentum pectinatum, and extends into the root of the iris (fig., *cc*). On one side the root of the iris and the adjacent portion of the ciliary body are replaced by an extension of the tumor cells, coating the anterior surface of the iris. No trace of the sphincter pupillæ could be found in sections through the tumor.

Just beneath the anterior capsule of the lens, where the tumor attains its maximum dimensions, a small circumscribed portion of the lens fibres is replaced by a collection of larger and smaller globular or polygonal clear masses (*e*).

The anterior segment of the retina contains a number of cavities which, in places, are arranged in a double row. A row of cavities is situated in each nuclear layer, with the outer molecular layer forming a bridge between them. In other places the two rows of cavities have coalesced by the disappearance of the outer molecular layer. The Müllerian fibres of the retina are greatly hypertrophied in the *cystic* regions, and form pillar-like, incomplete, vertical septa between the cavities. The remaining parts of the eye are normal.

Anatomical diagnosis.—Melano-sarcoma of the iris. Anterior polar cataract. Œdema of the retina.

ON THE BINOCULAR METAMORPHOPSIA PRODUCED BY CORRECTING GLASSES.

By J. A. LIPPINCOTT, M.D., Pittsburg, Pa.

IN a recent number [1] of the *Journal of the American Medical Association* appeared an article (by Dr. H. Culbertson) which had been read before the Ophthalmological Section of the Association in May of last year, describing certain apparent changes in the forms of objects observed by some persons after the correction of astigmatism of one or both eyes.

These changes were, in the article referred to, stated to be seen in regarding comparatively near objects, and only in binocular vision. A rectangular board, at the distance of a metre, appeared to be wider at one end than the other, and the floor seemed to slope to the right or left. With either eye singly, the phenomenon was not noticed. On rotating the cylinders a few degrees, the objects again appeared normal, and the radiating test lines of equal distinctness. These apparent changes were attributed by the author of the article to a want of muscular balance, owing to which, in using both eyes, one eye (or both) rotates more or less on its antero-posterior axis, thus necessitating a corresponding rotation in the correcting cylinders; and this change in the eyes he denominates "binocular astigmatism."

Now the phenomena noticed began to attract my attention, and what I conceive to be the true mode of their production occurred to me a number of years ago; but the

[1] Nov. 3, 1888.

matter did not seem to be of such engrossing importance as to develop an attack of *cacoethes scribendi.* The publication of the above-mentioned article, however, illustrating, as I believe it does, the fact that an unscientific hypothesis is apt to be followed by improper treatment, prompts me to commit my reflections on the subject to paper.

The literature of the subject is, so far as my opportunities for investigation have gone, conspicuous by its absence. Donders, Stellwag, and other systematic writers speak of the effect of glasses in changing the form of retinal images, and Knapp,[1] in pointing out the features of irregular astigmatism, mentions *inter alia* metamorphopsy—straight lines appearing curved, etc. But it is evident that monocular phenomena are referred to, and I can find no allusion to an apparent change in the forms of objects produced by correcting refractive aberrations, this change necessitating, as an essential condition, the existence of binocular vision. How necessary the latter is will, I think, appear in the course of this paper.

The hypothesis of a change in the position of the meridians of the astigmatic eye, either from rotation of the globe incident to muscular incoördination, or from a modification of the lenticular curvature incident to the act of accommodation, is, in my judgment, not satisfactory for the following reasons: (1) In the rather rare cases of actual paralysis or paresis in which there is an abnormal rotation of the globe, the abnormity evidences itself, and the relations of the objects are changed *spontaneously;* and no correction of an existing refractive error is required to bring out the defect. (2) The cases in which the astigmatic meridians occupy one position in distant and another in near vision, however the change may be brought about, are exceedingly rare; and, moreover, in such cases binocular vision plays no necessary rôle. (3) A fairly normal appearance of the radiating test lines after rotating the correcting cylinders in order to obviate a supposed rotation of the globe, by no means demonstrates a real correction of the astigmatic defect, because each eye supplements the other, and the deficiencies of each are thus

[1] Quoted by Power, Lond., 1868, p. 614.

neutralized or veiled. (4) The phenomena with which we are concerned are not rare, not even comparatively rare. On the contrary, they are to be seen in all cases of anisometropia with binocular single vision, with exceptions to some of which allusion will be made. The existence of an astigmatic defect is not a *sine qua non*, although the phenomena are especially noticeable in cases of astigmatism of one or both eyes, in which the chief meridians are oblique.

When both eyes require cylinders of the same degree, the axes must be unparallel. When the glasses correspond in strength, and the axes in position (actual isometropia), any obliquity of the latter is compensated for by turning the head, and the observed objects are thus prevented from assuming an unnatural appearance.

For the production of the phenomena described in this paper binocular single vision is necessary, because a means or standard of comparison is essential, and, as is well known, the field of accurate binocular fusion is quite limited, the mind receiving information from each eye, separately, in regard to its own side of all but very small objects.

Before generalizing further on the subject of binocular metamorphopsy, it will be proper to illustrate some of its manifestations. These manifestations may, for sake of simplicity, be divided into two groups: (1) Those characterized chiefly by an alteration in the relative dimensions of the top and bottom of the object—*unparallelism of the sides.* (2) Those characterized chiefly by an alteration in the relative dimensions of the two sides—*unparallelism of the top and bottom.*

Group I.—Top wider or narrower than bottom. (1) Suppose A., who rejoices in binocular single vision, requires, and is furnished with, R E + 1 D, L E + 1.25 c, axis 60°. On looking at a perfectly rectangular book, held upright, at ordinary reading distance, the right side of the book looks natural and perpendicular, whereas the left side appears to slope upwards and to the right, so that the top of the book seems to him narrower than the bottom. (2) Suppose R E fitted with + 1 D and L E with + 1.25 c, axis 105°, the right side of the book is normal, while the left side slopes

upward and to the left, making the top look wider than the bottom. (3) R E fitted with — 1 D, L E with — 1.25 c, axis 60°; while the right side of the book remains natural, the left side slopes upward and to the left, and the book is wider at the top. (4) R E — 1 D, and L E — 1.25 c, 105°; the left side now slopes upward and to the right, and the book is narrower at the top than at the bottom. (5) If A. be fitted with R E + 1.25 c, 100°, L E + 1.25 c, 60°, the left side of the book will appear to slope upward and to the right, while the right side will slope upward and to the left, though not so much as the left side. Hence the book will appear narrower at the top than at the bottom, the loss in width being sustained mainly by the left side. (6) With R E fitted with + 1.25 c, 80°, and L E with + 1.25 c, 115°, the book will seem wider at the top than at the bottom, the accession in width pertaining chiefly to the left side. To avoid repetition, the conditions of the last two cases will be reversed by substituting concave for convex cylinders. Finally, the form-changes described in the foregoing hypothetical cases can be observed by emmetropes before whose eyes cylinders are placed under the conditions stated above. The explanation of the above-mentioned phenomena will be obvious from a consideration of the annexed diagrams:

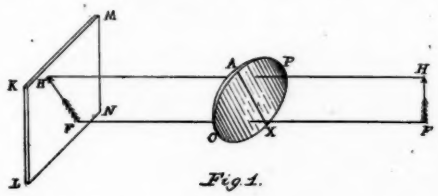


Fig. 1.

PAOX may be taken to represent a convex cylinder with its edge turned toward the observer and with its axis, AX, oblique. It is scarcely necessary to add that each half AOX and APX may be regarded as a prism with its base at AX. KLNM is a surface parallel to the plane of the lens. It is clear that a ray of light, starting from the head of the vertical arrow, H, will fall to the distal (from the observer) side of the axis, and will thus be deflected by the prism APX

towards the proximal side, KL, of the surface KLNM, to the point H.[1] Similarly a ray starting from F will come within the influence of the prism AOX, and will be deflected towards the distal side, MN, to the point F.[1] Again, if in fig. 2 PAOX be a simple concave cylinder, thus consisting

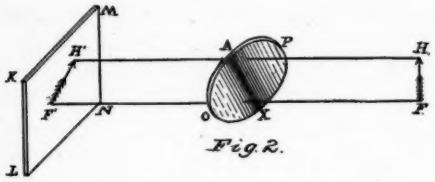


Fig. 2.

virtually of two prisms whose bases lie towards P and O, it is plain that the ray HH[1] will be deflected by passing through the prism APX towards the distal side MN, while the ray FF[1] will be refracted towards KL. Hence the image on the surface KLNM is inclined instead of vertical. It may be added that the deflection of the rays will be greater in proportion as the cylinder is stronger, and in proportion as the axis approximates the position midway between vertical and horizontal.

Let us suppose KLNM, in fig. 2, to represent the retina of an emmetropic left eye before which is placed the — cyl. PAOX. In the retinal image the arrow-head will point downwards and to the left, and, by the well-known law, the mental image will be projected in the opposite direction, so that the arrow will appear to be inclined upwards and to the right.

Now, we may, for our present purpose, consider an eye affected with simple HAS as equivalent to an emmetropic eye with a concave cylinder, such as PAOX (fig. 2), placed in front of it. In like manner we may regard an eye affected with MAS as equivalent to an emmetropic eye with a convex cylinder, such as PAOX (fig. 1), in front of it. Hence, in a case of astigmatism, axis oblique, the image of a vertical line occupies not a vertical but an oblique position on the retina; and hence, in such a case, there ought to be an apparent inclination of one or both sides, as the

case may be, of a square. To this part of the subject we shall return.

Group II.—Characterized mainly by a change in the relative heights of the two sides. This group may, for sake of convenience, be divided into two sub-classes: *Sub-class* (*a*). *Anisometropia without astigmatism.* Examples:

R E plano, L E + 1 D. The left side appears wider. Or, to quote from my records, R E − .75, S = $\frac{20}{xx}$, L E emmetropic, S = $\frac{20}{xx}$. R E reads best with a plano, L E with + .75; left side appears wider. To quote another case: R E + .25, S = $\frac{20}{xx}$; L E + 2.5, S = $\frac{20}{xxx}$; R E reads best with + 1.75; L E with + 4 D. Left side appears much wider.

As in Group I, experiments with emmetropes confirm the results of clinical observation, and show that if spherical glasses of differing degrees be placed before the eyes, the side of the object corresponding to the higher refractive index appears to be wider; and, furthermore, that the difference in width is proportionate to the difference in the indices of the lenses. *Sub-class* (*b*). *Unilateral or bilateral astigmatism*, but having a different *modus agendi* from astigmatism, as illustrated in Group I. It may be here remarked, that several years ago, when my attention was in the first place drawn to this subject, only the phenomena represented by Group I presented themselves clearly to me, the explanation, which then suggested itself, being amply corroborated by my record books. The matter was then gradually allowed to drop, and it was not until recently that the subject was again taken up, with the results illustrated by Group II. For this reason, although such cases as those given in sub-class (a) of Group II are numerous enough, typical clinical material coming under sub-class (b) is not, so far, abundant. From the cases which I have had the opportunity of examining during the past few weeks, I select the following:

(1) Miss McC. æt. twenty-two, R E + .5 c. vert., S = $\frac{20}{xx}$; L E plano, S = $\frac{20}{xx}$; right side wider. (2) S. P. B., R E emm., S = $\frac{20}{xx}$; L E + .5 c. vert., S = $\frac{20}{xx}$; left side wider. (3) Miss M, W., æt. fifteen, R E + 1.25 Sp, S = $\frac{20}{xx}$; L E + 1.5 c., 103°.

S = $\frac{20}{xx}$; left side appears wider than right. (4) Mrs. W., æt. forty-seven, R E + 1. Sp. − 4. c., axis hor., S = $\frac{20}{XL}$; L E + .5 −3. c., 24°, S = $\frac{20}{XL}$; R E reads best with + 4 c. vert., L E with + .75 + 3. c., 114°. Thus right side appears somewhat wider. (5) H. J. K., æt thirty, R E − .5, S = $\frac{20}{xx}$; L E − .5 − 1.75 c. vert., S = $\frac{20}{xx}$; R E reads best with a plano, L E with − 1.5 c. vert. Thus the right side appears much wider than the left.

From the above-cited cases it may be observed that if a + cylinder, ax. vert., be placed on one eye, and a plano [cases (1) and (2)], or a comparatively weak spherical [case (3)] on the other, the side corresponding to the cylinder appears wider. Case (5) shows that, on the other hand, a — cylinder with axis vertical has the effect of diminishing the width of its side.

The effect of convex and concave cylinders, with axes vertical, horizontal, and oblique, on the relative heights of the right and left sides of a square, was investigated in a considerable number of experiments with emmetropic eyes, and, while the results hinted at above were confirmed, the facts elicited were in some respects so unexpected, and, moreover, so suggestive, that it may be proper to briefly state them: (α) A + cyl. vertical, or a − cyl. horizontal, before either eye, widens the corresponding side of a square. (β) A − cyl. vert., or a + cyl. hor., narrows the corresponding side. (γ) If the cyl. (+ or −) is placed vertical, its effect is much greater than when placed horizontal.

The magnifying effect of a + cyl. progressively diminishes as the axis is turned away from the vert., until a point is reached midway between the vertical and horizontal (45° or 135°), at which point it is nil. If the movement of the axis be continued, a minifying effect is instituted, which progressively increases till the horizontal is reached. Precisely the converse takes place in employing a minus cylinder. (δ) The narrowing or widening increases with the strength of the cylinder (+ or −), until the latter is so strong that the image is blurred sufficiently to be suppressed mentally, and monocular vision in this way practically established. (ε) Lastly, while the effect of a given cylinder in the same position is not absolutely uniform in

different persons, nor even absolutely constant in the same person, the following table, which represents the results of a number of experiments, will probably be generally found very nearly exact. It is scarcely necessary to explain that on one side of the equation is placed the cylinder, and, on the other, the spherical glass which restores equality in height to the two vertical sides of the square.

(a) L E + 1 D c, vertical = R E + 2.25
(b) " − 1 D c, " = " − 1.75
(c) " + 1 D c, horizontal = " " − .75
(d) " − 1 D c, " = " + 1.25

From the above it will be seen [(a) and (d)] that a + cyl. vert. magnifies about twice as much as a — cyl. hor.; and that a — cyl. vert. diminishes about twice as much as + cyl. hor. If, then, one or both of the eyes be fitted with vert. or hor. cylinders, and if the two lenses bear to each other the relation given in the above table, there will be no metamorphopsy, notwithstanding the anisometropia. As already intimated, the effect of a + cyl. progressively decreases as it is turned from vertical to 45° or 135°, as shown in the following table:

+ 1, vertical L E = + 2.25 R E
" 105° " = + 1.65 "
" 120° " = + .75 "
" 135° " = 0 "

Thus if L E be fitted with + 1 c. vert., and R E with + 2 c, 115°, the top and bottom of the square may be parallel, but metamorphopsy will result, as illustrated by the cases in Group I.

An explanation of the cases coming under sub-class (a) of Group II is scarcely required. Donders (Syd. Soc. Ed., p. 152) shows that a convex glass placed before the eye, by moving the nodal point forward, enlarges the retinal image, while a concave glass, by moving the nodal point backward, diminishes the retinal image. But to explain the phenomena illustrated by the cases in sub-class (b) is a rather more difficult task, *e. g.*, a + 1 cyl., axis vert., held before the left eye, the right being covered, while it increases the width, cer-

tainly does not increase, rather seems to diminish, the height of a square. Nevertheless, if the right eye be uncovered, the left side at once appears markedly higher.

In like manner a — 1 cyl., ax. vert., before L E, R E being covered, appears to increase, rather than diminish, the height of a square; but, on uncovering the right eye, the left side seems markedly lower. So also, *a priori*, a + cyl., axis horizontal, ought to increase, instead of diminishing, the height of its side, while a — cyl., axis horizontal, ought to act in a contrary manner.

There are some reasons for supposing the explanation to be connected in some way with accommodation. Donders (p. 155) has shown that if the accommodative tension is relaxed, objects appear larger, because the mind conceives them to be at a greater distance. Besides, experiments do not give entirely uniform results in the same person. Indeed, at times the effect of the cylinder is not always obvious at the first glance, depending somewhat perhaps on the personal equation; and it changes from moment to moment as we look. Furthermore, the effect is most manifest at the reading distance—the point where accommodation is most exercised. On the other hand, it would seem that the mechanical change in the dioptric apparatus, known as the accommodative act, is not an essential factor, because in a number of thoroughly atropinized eyes precisely the same results, both in kind and degree, followed the use of cylinders, as are stated above to have been observed in non-atropinized eyes, whether astigmatic or emmetropic. It is possible, however, that the explanation of the phenomena lies in a change, produced by cylindrical lenses, in the dynamical or mental element of accommodation—in the *accommodative impulse.*

If this view be correct, we must, in order to account for the facts, assume that the accommodative impulse is affected in the cases under consideration unequally on the two sides; and, furthermore, that the degree to which, and the manner in which, it is affected vary according to the position of the axis. *E. g.*, a + cyl., vert., must markedly relax, while — cyl., vert., must markedly stimulate, the accom-

modative impulse of the eye before which it is placed, as compared with its effect on the other eye. Conversely, a + cyl., hor., must exert a stimulating, while a — cyl., hor., exerts a relaxing influence.

When the axis of the cylinder is vertical, and therefore the transmission of rays lying in a vertical plane uninterfered with, the full extent of this relaxation or stimulation is shown; but when the axis of the cylinder is horizontal, the influence on the accommodative impulse is partially neutralized by the action of the glass itself. *E. g.*, a + 1 cyl., hor., before left eye diminishes the height of the left side of a square *less* than the same cylinder, vert., increases it, because a + cyl., hor., before one eye (the other being closed) increases the height of objects, and to that degree lessens its binocular diminishing effect. Similarly a — 1 c., hor., L E, increases the height of the left side *less* than a — 1 c., vert., decreases it, because such a cylinder, monocularly used, diminishes the height, and so partially neutralizes its binocular magnifying effect.

The appearances under discussion might possibly be explained, though, to my mind, not so satisfactorily as in the manner above indicated, in the following way. The estimation of the height of each side is relegated to the eye on that side, whereas horizontal measurement is a common ground for the action of the two eyes. Now a + cyl., vert., L E, increases the horizontal dimensions on the left side; and the relation established by the right eye between vertical and horizontal measurements, being transferred to the left side, makes it appear magnified vertically, because it is magnified horizontally.

In what mode soever the phenomena of metamorphopsy are produced, they are very rarely consciously observed *spontaneously*. Hence, doubtless, the lack of attention devoted to the subject. With very few exceptions, the only persons, in my experience, who, after correction of their anisometropia, have complained of irregularity in the forms of objects, have been artists. This is a curious illustration of the extreme rarity of accurate observation. But, seldom as the patient speaks of the matter of his own

accord, if his attention is drawn to the subject, it is generally easy, by indirect suggestion, to make the apparent form-changes visible to him. *E. g.*, when the conditions required are present, the patient may be asked if he observes any peculiarity about the book. Sometimes he responds at once: "Oh, yes, it is wider at the top." More frequently, however, he replies: "I see nothing peculiar but the clearness of the type." He may then be asked (*e. g.*, in a case in which the left side of the square ought to look wider than the right): "Don't you think the right side of the page looks wider?" The patient, after a moment's consideration, will reply: "No, it is narrower"; and he is surprised that he did not notice it before. On the other hand, I have seen persons who were made dizzy, even to faintness, by the tipsy appearance of doors and windows; and it is not unreasonable to attribute, in part at least, to this distortion of retinal images, the discomfort which many persons experience, without being able to explain why, on being furnished with glasses which we feel sure are correct in every respect.

It has already been stated that, in a case of astigmatism, with axis oblique, there ought to be an apparent inclination of one or both sides, as the case may be, of a square; that objects, therefore, and their retinal images do not correspond in form. Experience, however, derived especially through the sense of touch, enables the mind to correct the erroneous information furnished by the sense of sight. In other words, inaccurate retinal images are translated into more or less accurate mental impressions. In adjusting his relations to external objects, in finding the haven of correct knowledge with so untrustworthy a compass to guide his search, what rocks and shoals the anisometropic child runs into, what falls and bruises he encounters from sloping floors, distorted furniture, and erratic stairways, none can know, since the educational process he is doomed to go through is an unconscious one. But a field of observation is here opened up which might repay investigation. For example, in children who are constantly stumbling and falling, it might be well to endeavor to discover whether the conditions of metamorphopsy are not realized.

Once the habit of correction is formed, and approximately accurate notions of form, notwithstanding the imperfection of the retinal images, are obtained, if the refractive defect be corrected, the mind, under the influence of habit, *over-corrects*, and the result is that, whereas an oblique retinal image gave the mental impression of a rectangular object, the corrected and rectangular retinal image gives the mental impression of a non-rectangular object. In this way the sides of the book appear to slope, and the top appears wider than the bottom, etc.

In regard to the more practical aspects of the subject of this paper, it may be remarked that as metamorphic vision depends on the formation of a mental habit, so its remedy consists in breaking up this habit; and it is probable that this end can be attained, at least fully enough to prevent serious annoyance, within a few months by the persistent use of the correcting glasses. The following case is interesting, as showing what can be done in this direction:

Miss S. K., æt. twenty-four, artist, examined under atropine September 10, 1886. R E —1—.75 c., vert., S=$\frac{20}{xx}$; L E —1, S=$\frac{20}{xx}$. R E reads best +.75 c., hor., L E +.75. Franklin glasses were ordered as follows: Above, full correction; below, R E +.75 c., hor., prism 2, inwards; L E +.75, prism 2, inwards. December 5, 1888: Has worn the glasses constantly, and has painted almost incessantly without inconvenience. With the glasses on, a square card looks perfectly natural. On removing the glasses, the *right* side appears decidedly wider.

This patient has thus been restored by the use of correcting glasses to a veritable "state of nature,"—to the condition in which she found herself when she first began to use her eyes, and before the educational process spoken of above was commenced. On the other hand, when the glasses are worn only for near vision, it is doubtful whether the metamorphopsy ever entirely disappears, although it may be somewhat lessened in degree.

W. C., æt. thirty-two, examined October 17, 1887. R E +.25+.5 c., vert., S=$\frac{20}{xx}$; L E +.25, S=$\frac{20}{xx}$. Reads best R E

+.75+.5 c., vert.; L E +.75. These glasses were prescribed. December 21, 1888, comes to have the prescription duplicated. With the glasses the right side is wider, but the sides are made equal by adding +.75 to the left side, instead of +1.5, which would be the average addition required.

Other cases which I have recently examined show very little, if any, diminution of the metamorphopsy after the use of reading glasses for two or three years.

According to my experience, the phenomena coming under Group I, *unparallelism of the sides*, are more disturbing than those illustrated by Group II. In such cases when the correcting cylinder is strong—above 2 D,—it is desirable to compromise with a weaker lens; but the correct glass ought to be given just as soon as the patient will tolerate it. Changing the position of the axis of the cylinder is as unnecessary as it is unphilosophical.

In conclusion, I scarcely deem it necessary to prolong this article by further citation of cases illustrative of the foregoing remarks. To report all of the material bearing on this subject which has come under my notice, would be to fill a good-sized volume.

Besides, I am satisfied that the every-day experience of my colleagues will furnish them with all the cases of binocular metamorphopsy which they can possibly desire to investigate.

A CASE OF EPIBULBAR ECHINOCOCCUS, WITH A REVIEW OF THE LITERATURE ON ECHINOCOCCUS CYSTS OF THE ORBIT.

By Dr. J. E. WEEKS, New York.

CASES of echinococcus[1] cysts in the orbit are of such rare occurrence (none having been reported in this country), that their clinical histories are of value as an assistance in the diagnosis of cystic tumors of the orbit, and in the prognosis and treatment of echinococcus cysts that occur in this region. For these reasons I have thought it best to report somewhat in full the following case of epibulbar echinococcus, and also to append a short review of all the authentic cases that I have been able to find reported in English and other literature, together with a few remarks. To the report of cases compiled by M. Dieu, Paris (*Rec. d'Ophthal.*, 1883 and 1884), I have added six others, five of which were reported subsequent to the appearance of his article. When possible the original articles have been consulted.

M. G., age twenty-two years. Austrian Jew. Tailor. Has been in the United States five years. Observes the precepts of the orthodox Jews in regard to his diet. Has no pet dog, nor is there

[1] Echinococcus hominis. A small cestoid helminth, about ¼ inch long, which inhabits the intestinal canal of the dog, wolf, and cat. The mature terminal link (proglottis) contains about 5,000 ova ; each ovum contains an embryo (proscolix). On entering the stomach of the host the embryo is liberated from the ovum by the action of the gastric juice, and bores its way through the stomachic or intestinal walls, and by the blood-vessels or lymph-channels finds its way into some solid organ, where it develops into a cyst (scolex). From the internal germinal wall of the scolex, or mother cyst, daughter cysts are formed.—(Cobbold on Entozoa.)

any kept in the family with which he resides. Patient presented himself at the clinic at the N. Y. Ophthalmic and Aural Institute, on September 14, 1888. Eight days previously he had experienced a slight dull pain in the right eye, and the eye became red. Two or three days afterward the patient saw double when looking downward or to either side. The pain gradually increased, and the right eyelids, particularly the upper, became swollen. Very slight headache; no constitutional disturbance.

Status præsens: The right upper lid is considerably swollen, causing obliteration of the natural depression below the margin of the orbit. The palpebral and the ocular conjunctiva to within about 2 *mm* of the margin of the cornea are injected; a scanty muco-purulent secretion is present. The movements of the globe are restricted in all directions. The margin of the cornea moves to within 4 *mm* of the outer and inner canthus. Movement upward almost normal, but does not go below the horizontal plane. Nystagmus exists in both eyes, and vision has always been below the normal. The present condition is: R V = $\frac{20}{100}$; L V = $\frac{20}{100}$; very little improvement with glasses. R = +T2; L = Tn. Aside from a possible slight rarefaction of the choroid, there is no pathological change in the interior of either eye. The right eye is a little more prominent than the left. On palpation over the right upper lid, a firm, elastic tumor is felt, situated in the orbit to the median side of its perpendicular meridian. The tumor moves with the movements of the globe, becoming more prominent if the cornea is rotated downward. When the upper lid is raised, and the cornea is rotated downward as far as possible, the tumor projects, pushing the fornix conjunctivæ before it, and putting the conjunctiva on the stretch. The apex of the tumor extends a little anterior to the equator of the globe, and appears to be about $\frac{3}{8}$ of an inch wide; its extent posteriorly cannot be determined. The apex of the tumor at its outer angle presents a yellowish appearance, suggesting the presence of pus; its inner angle is translucent, and of a bluish tint. Careful testing shows the tumor to be slightly movable on the sclerotic. The nature of the tumor was not at first determined; as it was attached to the globe it was thought that it might be connected with the interior of the eye, but its slight mobility on the sclerotic, and the absence of intra-ocular changes, excluded this possibility. Its elasticity and the indistinct sense of fluctuation imparted to the finger narrowed the diagnosis down to abscess or cystic tumor. It was thought best to

explore the tumor, which was done by passing the needle of a hypodermic syringe through the ocular conjunctiva into its interior. On aspiration, a few drops of a clear liquid were obtained, accompanied with a drop of pus. The opening was then made larger, by means of a Gräfe knife, permitting of the escape of a small amount of clear liquid and a few drops of pus. On pressure, a little more pus escaped, accompanied with seven transparent vesicles, which proved to be the daughter cells of an echinococcus cyst. This manœuvre caused the tumor to collapse. The opening was made still wider, but no other cysts escaped. The probe entered the cavity to the depth of about one inch; average width of cavity, $\frac{3}{8}$ inch. No attempt was made to remove the wall of the mother cyst. The cavity was syringed with a bichloride solution $\frac{1}{5,000}$, and the eye bandaged. The immediate effect on the movements of the eye was not marked.

September 15th.—Free discharge of pus; opening patent; membrane of cyst visible at the opening, but little pain referable to the eye. The eye moves freely in all but the downward direction. + T1; gave eserine $\frac{1}{2}$ %. Washed the cavity with bichloride $\frac{1}{2,000}$ and replaced the bandage.

Sept. 16th.—Pus less in amount. Movements as before. + T1. No pain. Dressed as before.

Sept. 17th.—Eye movable in all but the downward direction. No pain. + T. Size of cavity diminishing.

Sept. 25th.—Wound closed; a very slight epibulbar thickening may be felt at the site of the tumor. Tn.

Oct. 13th.—Eye white; movement free in all but the downward direction, in which it is limited to the horizontal meridian. No pain; nothing can be felt of the tumor.

The size of the daughter cells ranged from 17 by 9 *mm* down to 2 by 1 *mm*. A small yellowish mass projects into the interior of each, which probably represents the head of the entozoön. However, I have not been able to make out any hooks or suckers on these processes. On examining a daughter cyst with the microscope shortly after its removal, I discovered three hooks; but during the process of mounting, these disappeared.

The limitation of movement which persists in the case above reported, is undoubtedly due to the formation of connective-tissue bands which are attached to the globe and

to the intraorbital tissue. The formation of a connective-tissue capsule about the hydatid is commonly met with. (See Zehender's case.)

The following is a short review of all of the cases of intraorbital echinococcus that I have been able to find reported in medical literature:

SCHMIDT, J. A.—(From review by M. Dieu, in *Rec. d'Ophthal.*, Paris, 1883.)

CASE 1.—W. P., male adult, age twenty-six years. In January, 1801, patient experienced a feeling of distension at the back of the right(?) eye. Three weeks later the sense of distension had increased, with pain in the eye and in the same side of the head. The globe protruded, and the patient saw flashes of light. Patient slept but little. At the end of the fourth week the pain was intense. The globe, which was pushed entirely from the orbit and toward the nose, was slightly red; cornea clear, V = o. Patient was admitted to the hospital Feb. 4, 1801, in the above-described condition. On palpation a hard tumor was found at the outer angle of the orbit, extending behind the eye. Probably a steatoma; opium and hot applications. Death on the following day. Autopsy: death from cerebral venous thrombosis. On opening the orbit a fluctuating tumor was seen, filling the posterior portion, and extending forward beyond the outer and upper margins. The muscles, nerves, globe, and lachrymal gland were adherent. The membrane of the sac gave the characteristics of a hydatid cyst. No hooklets nor daughter cells were found.

SCHMIDT, J. A.—(From review by M. Dieu, in *Rec. d'Ophthal.*, Paris, 1883.)

CASE 2.—Patient, adult female, presented herself for treatment in May of 1802. Some time before applying, patient had experienced a severe pain in the right(?) eye and right side of head. The eye became inflamed a few days previous. A few days after seeing me the inflammation increased. Exophthalmus was marked; the cornea became completely infiltrated with pus, and perforation with protrusion of the iris quickly followed. Hemicrania became intense; parotid painful to the touch. Tumor of the lachrymal gland was diagnosed, and the patient was sent to a surgeon, who introduced a trocar, directed toward the lachrymal gland through the upper lid. One ounce of a clear liquid was evacuated. The pain ceased a few hours after the

operation, and the exophthalmus diminished from day to day, until the eye resumed its normal position. On the 4th day after the operation a large daughter cyst was discharged. Healing complete in 14 days.

V. DELPECHE.—(From review by M. Dieu, in *Rec. d'Ophthal.*, Paris, 1883.)

CASE 3.—Male, twenty-five years. Noticed some pain in the right eye in 1820. Partial failure of vision occurred during the next year. In April, 1822, patient noticed that the eye was prominent, and the eyelids were swollen. Admitted to the hospital Nov. 8, 1822. At this time the eye was prominent, but could be covered by the lid; cornea hazy. A tumor extending back of the globe and giving an obscure sense of fluctuation could be felt above and below the eye. Nov. 13th, operation. The external commissure was divided, and a portion of the lachrymal gland which presented was excised. It was then found that the tumor could be best reached from above, and it was cut down upon through the upper lid. The scalpel entered the tumor and about three ounces of a clear liquid escaped. The cyst wall was readily detached and was removed entire. Examination of this membrane showed it to be the wall of a hydatid cyst. Recovery after suppuration, complete in fifteen days. The eye returned to its normal position and its function was almost completely restored.

LAWRENCE.—(Mackenzie on the Eye, Phila., '55, p. 1006.)

CASE 4.—Patient, male, aged forty-two years. Admitted to the Lond. Oph. Infirmary, January 3, 1820. The growth had been developing for seven years. *St. pr.:* Globe pushed completely out of the orbit by a deep-seated growth, which could be felt as a firm elastic tumor just below the supercilary arch. Ocular conjunctiva thickened by inflammation consequent on exposure; globe uninjured. Pupil immovable, medium size; V = o. The patient had suffered great pain during the progress of the growth, and was pale and emaciated. Operation—The tumor was punctured, permitting about ½ oz. of a clear liquid to escape, which caused a diminution of the pain. Two days later Mr. Lawrence found a soft white substance in the opening made, which proved to be a hydatid; others escaped on pressure. The opening was enlarged the next day, and half a teacupful of hydatids removed. Inflammation and suppuration, with slight

pain, followed. The eye returned to its natural position, and the opening closed in about one month.

HOLSCHER.—(From review by M. Dieu, *Rec. d'Ophthal.*, 1883.)

CASE 5.—Male of seventeen years. First observed by Holscher, March 9, 1832. One and one half years before, patient noticed that the right eye protruded. The exophthalmus had increased until it had become very marked. V good; but little pain; no nausea; no vertigo. On palpation an elastic tumor was found. Diagnosis: Hydatid cyst. An incision was made through the lower lid at the margin of the orbit, the knife passing in about ten lines. About one drachm of a clear liquid was evacuated. The eye resumed its normal position; no inflammation followed. March 12th: The tumor is again firm. The operation was repeated, but less fluid was obtained. Suppuration was encouraged, and was accompanied with fever, chill, and intense pain. March 15th: Warm compresses applied; fever and inflammation less. March 19th: A large hydatid was discharged. March 25th: Fluctuation back of globe; exophthalmus. April 3d: Incision repeated, liberating a clear liquid. A seton was introduced, followed by very intense reaction, fever, pain, vomiting, delirium, chills. Calomel and quinine were administered, and cold applications made. April 18th: A second hydatid, the size of a pigeon's egg, escaped. After this the suppuration ceased and the patient recovered without a trace of deformity. Discharged from the hospital May 12th.

TAVIGNOT.—(From review by M. Dieu, *Rec. d'Ophthal.*, 1884, p. 7.)

CASE 6.—Child, four and one half years. Observed in 1848. Three months before the patient was seen the eye became prominent and vision failed. *St. pr.:* Exophthalmus very marked; iris immovable. Media clear. V = o. A tumor protrudes at the outer side of the eye, which is hard, regular, and elastic, the exposed end of which is about the size of an almond. Operation.—An incision was made into the exposed end of the tumor, after which considerable clear liquid of a citron color escaped, together with about twenty small cysts averaging the size of peas. These small cysts were contained within a common sac. Panophthalmitis and phthisis of the globe followed.

WELDON.—(Reviewed by M. Dieu, *Rec. d'Ophthal.*, 1883.)

CASE 7.—Patient, adult female. Two years before, the patient had experienced severe pain in the eye, the movements of which

were impeded. Eyelids rigid. Protrusion of the eye developed. The pain became intense, and produced mild delirium. When seen by Mr. Weldon the globe was almost entirely outside of the orbit, was turned toward the nose, and was immovable. V = o. Lids discolored and immovable. General engorgement of surrounding integument. The pain in the head and eye was intense and without remission. Palpation of the tumor over the lower lid gives an obscure sense of fluctuation or a feeling resembling that imparted by adipose tissue. The tumor was punctured with a cataract knife through the lower lid at the margin of the orbit, and a little clear liquid expressed. The incision was carried to the external commissure. At the end of four or five days a large daughter cyst was removed. The eye returned to its normal position, and recovery was completed in three weeks. V = o.

GOYRAND.—(*Annal. d. l. Chirurg. française et étrang.*, vol. viii.)

CASE 8.—This case is not reported in full. It occurred in a child, and came under Goyrand's observation in 1843. There was some exophthalmus and great swelling of the conjunctiva, which was ulcerated. The tumor was incised, permitting the escape of a hydatid cyst. Recovery was complete.

DORNBLÜTH.—(From review by M. Dieu, *Rec. d'Ophthal.*, 1883.)

CASE 9.—Patient, female, aged twenty-two years. In August of 1840 patient had an inflammation of the left eye ; lids swollen ; pain severe. Leeches were applied. This condition persisted until October, at which time the patient entered a hospital where she was treated a long time without benefit. When seen by Dornblüth, in February, 1841, the pain was so severe that the patient could not sleep. The globe was forced toward the temple, was almost outside of the orbit, and was but slightly movable. Cornea clear and covered by the lids, which were much swollen. Anterior chamber normal ; V = $\frac{1}{\infty}$. Ectropium of lower lid. A large tumor filled the orbit and protruded at the inner angle. Diag. : Hygroma of orbit. Operation—An incision was made through the lower lid into the tumor, from which a large amount of clear liquid escaped. The tumor diminished in size and the pain immediately subsided. A sound could be passed nearly to the apex of the orbit. A piece of charpie was inserted. On the ninth day a dense membrane was observed at the wound, which was withdrawn entire, and proved to be the wall of the sac, with

a capacity of 2 oz. Suppuration profuse. The globe returned to its normal position and retained its normal size. V = o. Recovery favorable.

GRACIA ROMERAL.—(From review by M. Dieu, *Rec. d'Ophthal.*, 1883.)

CASE 10.—Patient, girl of sixteen years. Was first seen in July, 1845, at which time the left eye protruded slightly ; no pain. Intra-orbital tumor diagnosticated. Pain in the orbit about the last of August ; V = $\frac{1}{\infty}$ at which time the exophthalmus was excessive, refracting media clear, conjunctiva swollen. At the internal angle of the eye a tumor is seen, which apparently fills the orbit, extends to the lachrymal sac, and presses on the internal rectus and optic nerve. Tumor slightly movable ; fluctuates. The pain is continuous, but is most marked at night. Diag.: Cystic tumor of orbit. Operation—Incision through the lower lid one inch in length ; tumor denuded and incised. A clear liquid escaped. The eye regained its normal position almost at once. Some hours afterward, an attempt was made to introduce a piece of charpie, when a whitish membrane was encountered which was removed entire. It was found to be a large hydatid cyst. The charpie was then introduced to the fundus of the cyst cavity. Erysipelas and suppuration followed. On recovery the vision became normal. (?)

BOWMAN.—(Mackenzie on the Eye, Phila., 1855, p. 1007.)

CASE 11.—J. W., male, age twenty years. Prominence of the eye noticed three years previously. A tumor is present in the upper inner angle of the orbit, which pushes the globe downward and outward and gives an obscure sense of fluctuation on palpation. Globe collapsed ; cornea sunken and flaccid. The appearance accompanied with the pale emaciated condition of the patient suggested malignant growth. Pain in and above the eye has been experienced ever since the tumor was first observed. V = o, Aug. 27, 1852 : An exploratory puncture was made by raising the upper lid and passing the knife through the conjunctiva. Some clear fluid escaped, causing a marked diminution in the size of the tumor. The opening was enlarged and the cavity found to extend to the apex of the orbit. Hydatids were searched for, but none were found. Suppuration followed. At the end of a week three hydatids were discharged, two of which were as large as marbles. Soon after this the headaches ceased, the swelling subsided, and the globe returned to its normal position.

ANSIAUX.—(*Gaz. des Hôpitaux*, 1854, p. 514.)

CASE 12.—J. P. aged eight years. Male. Came to the clinic April 12, 1846, with a tumor in the inferior external angle of the left orbit. The tumor was first noticed about the end of October, 1845. About the 1st of April it increased rapidly in size and forced the eye upward, inward, and outward. At the present time on retracting the lid the end of the tumor is exposed; it is firm, but is slightly movable in the orbital tissue. April 15th. The tumor has the appearance of a phlegmon. It was punctured and a large quantity of a clear liquid and a little pus escaped. Afterward the wound was enlarged and pressure exerted, causing the escape of a hydatid cyst. The cyst cavity closed, and the eye regained its normal position and movements.

GOYRAND.—(*Annal. d. l. Chir. franç. et étrang.*, vol. viii., p. 475.)

CASE 13.—Patient, aged eleven years, was seen by Goyrand about the 1st of June, 1828. Two years previously the parents had noticed a bulging of the left eye. *St. pr.:* Left eye pressed upward, inward, and outward, is but partly covered by the lids, and immovable. The cornea is opaque. V = o. Ocular conjunctiva injected. Intense pressure-pain complained of. A tumor presents at the orbital margin below and to the outer side, which is hard and elastic, giving a faint sense of fluctuation on palpation. The palpebral fissure is elongated; tumor covered with conjunctiva. Diag.: Hydatid cyst. Operation, June 11th—The commissure was divided and the cyst cut down upon through the conjunctiva. By a movement of the child the scalpel was caused to penetrate the cyst. A clear liquid escaped and the tumor collapsed. A piece of the cyst wall and conjunctiva was excised, and a probe was introduced which passed to the apex of the orbit without obstacle. A large hydatid (daughter) cyst was removed and the eye resumed its normal position. The wound was closed by sutures and a cold compress bandage applied. Sero-sanguinolent discharge during the day. The next morning there was marked swelling of the whole upper part of the face, accompanied with intense pain and some fever. The sutures were removed in the evening and an emollient poultice applied. June 13th: Pain and swelling much less pronounced. Sero-purulent discharge. June 16th: Suppuration has ceased; eye less prominent. Incision at commissure united. June 18th: Lids still a little swollen. Eye in normal position. July 1st: No sign of exophthalmus. The

globe has not yet regained its normal mobility. Cornea clear. Vision improving.

HULKE.—(*Lond. Ophthal. Hosp. Rep.*, 1865, p. 91.)

CASE 14.—Patient, a boy. Has noticed an increasing protrusion of the eyeball for some months. At present the eye appears to lie outside of the orbit, and is displaced upward. The lower lid is depressed, and is separated from the globe by a firm, elastic, rounded, smooth, fluctuating tumor, which protrudes between the margin of the orbit and the globe. No œdema. The outward and downward movements of the eye are abolished. Mobility slight in other directions. $V = \frac{5}{60}$. Patient pale and weak; has suffered great pain. April 21st: The swelling was explored with a grooved needle, when some colorless fluid escaped. An incision was then made through the lower lid, parallel to its border, into the tumor. Several drachms of a clean fluid escaped. The finger could be passed into the cavity to the apex of the orbit. No distinct separate cyst was discovered. On the following day the wound suppurated freely, accompanied with headache and fever. A hydatid cyst, about the size of a pullet's egg, was found in the poultice. The wound now healed quickly. Dec., 1862: Position and motion of eye nearly normal. $V = \frac{1}{200}$.

CARATHEODORI.—(From review by M. Dieu, *Rec. d'Ophthal.*, 1884.)

CASE 15.—Patient, fourteen years of age, has been suffering intense pain in the back part of the orbit during the last six days. Somnolence and delirium. Conjunctiva injected. Eye prominent. Orbital periostitis was diagnosticated, a purgative given, and leeches applied. Patient returned at the end of six months. Pain insupportable; the left eye protruded very much. Upper lid forcibly applied; lower lid everted, and conjunctiva covered with a membrane and profuse granulations. The tumor filled the back part of the orbit and was firm and elastic. It was punctured, and a clear liquid escaped, causing the tumor to diminish in size, but the pain remained. Erysipelas of a mild degree followed the operation. A few days later an incision was made through the outer half of the upper lid. A whitish tumor was found, which was incised, and a piece of charpie introduced. The pain disappeared and the globe regained its normal place in twelve days. Eighteen days after the operation a white mass presented at the opening, which on removal proved to be the entire wall of

the cyst. Recovery rapid. The granulations on the lower lid were burned off. Functions of the eye restored.

WALDHAUER.—(Ophthal. Congress, Sept. 5, 1865.)

CASE 16.—E. H., male, thirty-seven years. Inflammation of right eye two years previously, at which time vision was lost. Partial recovery followed. Pain in the right eye and right side of head from time to time since. A few days before the patient was admitted to the hospital, which was on Dec. 16, 1864, the pain became intense. Globe prominent, hard, and slightly movable. $V = \frac{1}{\infty}$; mild degree of papillitis, with choroiditis. Pain lessened by application of leeches. January 7th: Strabismus divergens, right. Pain intense; relieved by injections of morphine. July 16th: Exophthalmus more marked. Pain constant and intense in the right side of the head. Optic nerve atrophic. At the superior inner angle a soft fluctuating tumor is felt. On puncture with a trocar a clear limpid fluid, containing no albumen, escaped. The eye returned to its normal position; pain ceased. Much swelling of the lids followed, which was reduced with poultices and compresses of camomile. The author endeavored to remove the tumor through the palpebral fissure and to preserve the globe, but after the incision was made exploration with the finger showed the orbit to be filled with the tumor, which was in part hard and in part soft. Preservation of the eye was deemed impossible, and it was enucleated. On attempting to remove the tumor it was incised with the scissors, and a large number of hydatids, from the size of a lentil to that of a pea escaped. Almost the entire contents of the orbit were removed. Suppuration, granulation, recovery. Two of the recti muscles were in a state of degeneration (myositis interstitialis).

DESMARRES.—(From review by M. Dieu. *Rec. d'Ophthal.*, 1884, p. 18.)

CASE 17.—A young girl consulted Desmarres for a paralysis of the muscles of convergence of the left eye with exophthalmus. A tumor of the orbit was diagnosticated. On puncturing the tumor with a trocar some clear liquid escaped. A number of echinococcus cysts appeared later. Complete recovery resulted.

DUDON.—(From review by M. Dieu, *Rec. d'Ophthal.*, 1884, p. 20.)

CASE 18.—Male, aged thirty-eight years. Violent pain in right side of head. Right eye prominent. The tumor opened sponta-

neously two years ago, permitting a clear liquid to escape. *St. pr.:* The whole orbital region on the right side is prominent. Lids swollen and œdematous. Lower lid everted. Palpebral fissure elongated. Margins of lids separated about 1 *cm.* Cornea hazy; vision fair. Media transparent; movements of eye limited. On palpation the tumor is found to be elastic, firm, fluctuating, trembling. Operation—Puncture. Thirty grammes of a citron-colored liquid escaped. Diagnosis: Serous cyst of orbit. An opening was made between the globe and the inner angle of the orbit at the most prominent part of the tumor. Some liquid escaped, the tumor became smaller, and the eye less prominent. A drain was inserted and the part poulticed. Six days afterward the drain was found in the dressing, and a hydatid cyst, size of a small hen's egg, was found engaged in the wound. This was removed, and recovery became complete four days later. The cyst occupied Tenon's capsule.

MACGILLIVRAY.—(*Annal. d'Oculistique*, review, 1866, p. 172.)

CASE 19.—The tumor developed back of the globe in the inferior part of the orbit, producing marked exophthalmus and ectropium of the lower lid, and was six years in developing. Nine daughter cells were found. After the operation the globe gradually resumed its normal position, but the vision equalled perception of light only.

BILLROTH.—(From review by M. Dieu, *Rec. d'Ophthal.*, 1884, p. 17.)

CASE 20.—Child of six years, male. Exophthalmus of left eye, which has been developing for two years. Vision good; diplopia. A fluctuating intra-orbital tumor could be made out. Diag. doubtful. Jan. 26, 1872: The tumor was punctured, and a limpid, non-albuminous fluid escaped. The tumor was again incised on Jan. 31st, at which time a large echinococcus cyst was removed. No suppuration followed; the globe returned to its normal position. The patient was discharged, but returned to the hospital on Feb. 21st, on account of persistence of the diplopia.

VERDALLE.—(From review by M. Dieu, *Rec. d'Ophthal.*, 1884, p. 14.)

CASE 21.—Observed about the year 1872. Patient, male; aged twenty-five years. *St. pr.:* Phthisis bulbi, right, from traumatism. Fistula from the frontal sinus, right side, discharging pus. A soft fluctuating, pulsating tumor, almost completely

encased in a shell of bone, projects from this point. It is apparently increased in size when crying is attempted. Exorbitismus very marked. The shrunken globe floats on the surface of the tumor, and imparts an obscure sense of fluctuation if the finger is placed on it. A small incision was made in the frontal tumor, and a hydatid presented at the opening. This was removed entire from the osseous orifice, and was followed by a flow of pus. Pressure on the globe caused six or eight hydatids to escape by this opening. The orbitismus disappeared; the frontal opening communicated with the orbital cavity by an opening through the roof of the orbit; the external opening was through the upper lid. Recovery complete.

BRESGEN.—(*Berl. klin. Wochenschr.*, 1874, p. 381.)

CASE 22.—V. R., aged fifteen years, male. Patient complained of headache eight days before being seen by me. *St. pr.:* Right upper lid swollen; headache and pain in right eye. Three weeks afterward the eye appeared forced downward and outward; lids more swollen; an ulcer of the lower part of the cornea existed; fever, with accelerated pulse; brain not clear. An incision through the upper lid was now made, permitting of the escape of pus. Three days later a cystic tumor was discovered in the depth of the orbit, which, as the eye had not receded much after the first operation, was cut down upon by enlarging the first incision. An echinococcus cyst was found. Shortly after this operation the cornea ruptured, and prolapse of the iris occurred. Death by meningitis closed the scene.

LAWSON.—(*London Lancet*, 1876, p. 570, vol. i.)

CASE 23.—Patient, male, aged twenty-nine years. Came to Moorfields in October, 1872. Ten weeks previously noticed that something was the matter with the left eye. *St. pr.:* Eye protrudes half an inch beyond the orbit; marked divergence; tension normal. $V = \frac{1}{200}$. Choked disc. A soft mass is felt at the upper inner angle of the orbit, which imparts a sense of fluctuation on palpation. The tumor was punctured through the upper lid, and about two drachms of a clear fluid escaped. Feb. 14th: Patient admitted to the hospital for the removal of the tumor, which has greatly increased in size. $V = \frac{1}{\infty}$. Operation under ether. The upper lid was incised to expose the tumor, which was punctured, permitting of the escape of a clear liquid, together with two or three small echinococcus daughter cysts. The

walls of the parent cyst were drawn out entire. The wound suppurated, and the eye immediately began to recede. The patient left the hospital in one week. V = $\frac{20}{200}$.

WESTPHAL.—(*Berl. klin. Wochenschr.*, 1872, p. 205.)

CASE 24.—H. B., aged seventeen, male. Was seen by Westphal Nov. 7, 1872. In the preceding May patient had suffered severely from cephalalgy, accompanied with vomiting, and was confined to the bed eight weeks. Vision much diminished; photophobia intense; right eye became blind in the course of a year; felt a sense of pressure in the right orbit from time to time, but was well in other respects. Had headache and nausea eight weeks before seen by Westphal, together with weakness of the right extremities. *St. pr.:* Patient is well nourished; no fever; pulsating headache; no pain on percussing skull; exophthalmus of right eye, not covered by the lids; movements free; tension normal; V = $\frac{1}{\infty}$; L V = $\frac{1}{200}$; temporal half of field gone; disc pale; paresis of left extremities. Diagnosis: Tumor in anterior part of the right middle cerebral fossa projecting into the right orbit. Dec. 12th: Œdematous swelling of right upper lid; chemosis of conjunctiva; no redness; pain in the vicinity of right parotid gland. Dec. 15th: Right temple and cheek prominent; soft, fluctuating. Dec. 21st: A puncture caused the escape of a few drops of blood. Dec. 23d: A hole was noticed in the frontal bone above and to the outer side of the commissure, which would admit the end of a finger. Dec. 31st: A definite fluctuating tumor was felt in this region; no fever. Diagnosis: Echinococcus cyst. A puncture was made permitting the escape of some thin pus and some small cysts without hooklets. On Jan. 3d an incision about 2 *cm* long was made, permitting of the discharge of a little fluid containing pus. Next day quite a number of hydatids escaped. Feb. 4th: On syringing, three cysts came out of the left nasal cavity. Two openings appeared on the temple. The last cyst came from the left nasal cavity on Feb. 20th by syringing. In all, nineteen cysts, some containing heads and hooklets, were discharged. The paresis, exophthalmus, and pain disappeared.

HIGGINS.—(*London Lancet*, 1876, vol. ii., p. 576.)

CASE 25.—Patient, a girl of fourteen years. The right eyeball, over which the lids could be closed, was pushed downward and outward. Upward movements of the globe restricted. Diplopia.

V = Sn. No. 10. Papillitis marked. Eye red and painful. No rigors or constitutional disturbance. Twelve days later there was a fulness of the upper lid, and an abcess was suspected. An incision was made through the conjunctiva above, permitting the escape of some blood only. A probe passed into the incision came in contact with a hard body. Two weeks later the swelling had increased. An incision was then made through the soft parts parallel to the margin of the orbit. The lachrymal gland which presented was removed and an attempt made to tear away the growth. It collapsed and was found to extend to the apex of the orbit. The cyst was detached from the optic nerve, to which it was adherent, and excised. No daughter cysts; no hooklets found. The wound was stitched up. Suppuration followed, but the patient made a good recovery. When seen, one month afterward, the eye still deviated downward. Upward motion abolished; ptosis. Patient reads Sn. 2½ readily. The papillitis has subsided.

MORELLA, P.—(*Revista Clin. e Therapeu.*, Napoli, 1882.)

CASE 26.—A. B., adult, female. Presented herself at the clinic of Prof. Gallozzi, February 9, 1876. Some time before, the patient had experienced pain in the left supra-orbital region, and had noticed a small swelling in the orbit at the upper inner angle, which pushed the globe downward and outward sufficiently to produce double vision. The pain increased. Vision diminished and some fever was experienced. The globe could be pushed back to its normal position; it presented no change. *St. pr.:* Protrusion of upper lid; conjunctiva red and swollen; movements of eye limited; iris normal; counts fingers at a short distance. Ophthalmoscopic examination shows the retina to be anæmic, nerve atrophic. On palpation, a hard elastic tumor is found at the upper inner angle of the orbit, pressure on which occasions pain. Diagnosis: Tumor springing from the inner wall of the orbit; probably malignant. The pain continued; cornea became opaque; tumor slightly enlarged. On aspiration with a Pravas syringe, a small amount of a clear liquid was removed, which contained hooklets. Chemical examination showed an abundance of sodium chloride—no albumen. Diagnosis: Hydatid cyst. There was but little reduction in the size of the tumor after the aspiration, and as the cephalalgia and pain in the eye became intense, a radical operation was done March 24th, under chloroform. The palpebral fissure was enlarged by an incision at the commissure, and the eye and tumor, which was found to be a large hydatid cyst

containing pus and a clear liquid, were excised. Cavity washed with sublimate ½ %. Healing regular.

DE LA PEÑA.—(*La Oftal. Practica*, 1882, pp. 6–12.)

CASE 27.—de Villacañas, adult, male. January 25, 1879. Pain in eye and orbit; slight exophthalmus. V = $\frac{20}{30}$. No intra- or extra-ocular change. A swelling developed just below the upper orbital margin, and the exophthalmus became more marked. Vision diminished, and an excavation of the disc, with diminution in the size of the vessels, was observed. Diagnosis: Deep intra-orbital tumor with secondary glaucoma. A sclerotomy was made, which relieved the patient of pain and caused an improvement in vision. The movements of the eye became limited in all directions; the exophthalmus increased, the globe finally protruding between the lids; cornea hazy. Continued pyrexia of a low degree was noticed. On palpation the tumor gave an obscure sense of fluctuation. Conjunctiva congested. Feb. 10th: Operation under ether. The tumor was punctured through the conjunctiva and 100 grammes of a clear liquid were evacuated. A circular opening in the conjunctiva was then made as for enucleation. The tendons of the internal and inferior recti, and the optic nerve, were divided. The globe was then dislocated, when the tumor was found to be entirely extra-ocular. The cavity was syringed with dilute acetic acid. Profuse suppuration followed, resulting in a favorable recovery in twenty-four days. The eye returned to its normal position; however, the cornea was partly lost by suppuration during the process of healing. The diagnosis of hydatid cyst was made by the microscopical examination of the cyst wall.

HARDY.—(*Australian M. J.*, Melbourne, 1879, p. 589.)

CASE 28.—R., aged twenty-two years, female. Admitted to the hospital March, 1879. Three years before, experienced pain in left eye, followed by gradual swelling. V=$\frac{1}{\infty}$. Twelve months afterward the pain became more severe. The patient suffered more in the winter than in the summer. *St. pr.:* Patient anæmic. Great protrusion of the left eye. V = 0. Tumor of the orbit was diagnosticated. The eyeball was removed and a cystic tumor found, a part of the wall of which was excised and a semi-solid mass removed. Nothing further was done. The wound healed nicely. The patient returned in six months, presenting an orbit which was filled with a soft elastic tumor. In attempting to

remove the tumor entire it was punctured, and six or seven daughter echinococcus cysts escaped. Patient made a good recovery.

DIEU.—(*Rec. d'Ophthal.*, 1884, p. 22.)

CASE 29.—Patient, female of twenty years. Seen Feb. 26, 1883. Diplopia five months previous. Has experienced pain for five days, which was first referred to the point of emergence of the supra-orbital nerve, afterward it extended to the temple and infra-orbital nerve, becoming very intense. Could not sleep. Prominence of eye noticed three months previously; it increased slowly up to five weeks ago, since which time the increase in prominence has been rapid. *St. pr.:* Exophthalmus marked; movements of eye abolished. The nasal portion of lower lid protrudes, presenting a firm, fluctuating tumor, which gives pain on pressure. No pulsation or souffle. Conjunctiva red and œdematous. Ophthalmoscope shows disc a little pale, arteries small, veins full and tortuous; $V = \frac{1}{60}$. The patient is in a semi-somnolent condition. Diagnosis: Serous cyst of the orbit, probably hydatid March 3d: Puncture at the most prominent part, on the lower lid; 50 grammes of a clear liquid escaped. The eye returned to its normal position; $V = \frac{8}{200}$. The pain stopped almost immediately. A compress bandage was applied. Examination of the liquid showed but little albumen; sodium chloride abundant. March 4th: Exophthalmus; $V = 0$; lids swollen; conjunctiva red and œdematous; pain. March 6th: The œdema extends to the cheek; pain intense; no fever. March 10th: A large incision was made at the point of the first opening. Pus escaped. A sound enters to the depth of 5 *cm.* Drainage; poultices. In a few days the œdema and exophthalmus diminished, and the pain ceased. $V = 0$. A compress bandage was applied. March 20th: Drain forced out; the opening was dilated with a laminaria tent, and the drain replaced. March 22d: The drain was again forced out. A large hydatid cyst presented at the opening, and was removed with the forceps. Drain re-introduced; eye bandaged. Patient discharged, April 2d. Condition when discharged: divergent strabismus; limitation in mobility; $V = 0$, nerve atrophic.

MULES.—(*Trans. Oph. Soc. United Kingdom*, 1883, vol. iii., p. 22.)

CASE 30.—The patient, a boy of six years, was seen by Mr. Mules in June of 1882. Four weeks previously the patient and

friends had noticed that the right eye protruded. *St. pr.:* Exophthalmus marked; movements of globe impeded in every direction; V = $\frac{1}{15}$. Ophthalmoscopic examination shows congestion of the veins only. Behind and to the outer side of the globe a firm lobulated tumor can be felt. Immediate operation was advised. The outer canthus was divided, under chloroform, and the growth cut down upon between the external and the superior recti muscles; the knife penetrated the tumor and a quantity of clear liquid escaped. The eye receded, and vision became $\frac{6}{6}$. Ten days later the eye again protruded. At the end of the twelfth day choked disc, with an elevation of 1 *mm*, existed. Operation—The cyst was cut down upon as before. The adherent external rectus was dissected off, and the cyst traced to the apex of the orbit. It was not excised, but was then opened and two drainage tubes were inserted. Suppuration, with slight fever, ensued. At the end of a week a large cyst (probably daughter cyst) was discharged. After this the wound healed favorably. Weakness of the external rectus remained, necessitating division of its opponent; V = $\frac{6}{6}$. The diagnosis of echinococcus was made by a microscopical examination of the cyst wall. No hooks were found. The discharged liquid was free from albumen.

ZEHENDER.—(*Klin. Monatsbl. f. Augenhl.*, 1887, vol. xxv., p. 333.)

CASE 31.—Patient, thirty-eight years, male. Applied for treatment Nov. 3, 1886. V slightly impaired. Ophthalmoscopic examination showed the veins to be distended. Slight exophthalmus of the right eye, first noticed six weeks before. Jan. 16, 1887: Exophthalmus increased; V = $\frac{20}{200}$; choked disc. By deep pressure into the orbit, above and to the temporal side, a small elastic tumor could be felt. The globe was pushed downward and inward. Feb. 17th: Protrusion of the globe much more marked. Operation under chloroform. The commissure was divided, and the tumor cut down upon through the conjunctiva. A sharp hook was inserted, and an attempt made to pull the tumor out of the orbit; the sac wall gave way, and a clear fluid escaped, infiltrating the orbital and the sub-conjunctival tissue. The cyst wall retracted behind the globe, which receded but little. The wound was closed by two sutures, eye washed with bichloride 1 to 500, iodoform dusted on, and bandage applied Feb. 18th: Whole of right side of face swollen; swelling of left lid with pain and ciliary injection of left eye; V, left, = $\frac{6}{6}$. Patient very sick, has

vomited repeatedly. The stitches were removed and the swelling subsided. An ulcer formed in the lower cul-de-sac to the outer side, which did not respond to treatment, otherwise the healing was favorable. As the globe did not recede, a second operation was done on May 13th. This was begun as in the previous operation. A mass of dense connective tissue, 1 in. by $\frac{1}{2}$ in., was removed, then came some adipose tissue, and, finally, a large echinococcus cyst embedded in dense connective tissue. After the removal of more connective tissue, the palpebral fissure was closed with sutures, and the eye bandaged antiseptically. Healing progressed favorably, and the cornea, which was quite opaque, became clear in three days. The conjunctival ulcer persisted and necessitated a third operation, which was done on June 6th; the ulcerated tissue was removed. At the end of fourteen days the globe had returned to its normal position. Motion outward and upward abolished. Double vision corrected with a prism. In the examination of the cyst no scolices or hooks were found; probably an acephalocyst.

No.	Author.	Age.	Sex.	Date.	Duration of Disease.	No. of Operations.	Contents of Cyst.	Eye.	Results and Remarks.	Original References.
1	Schmidt.	26	Male.	1801	1 mo.	None.	Clear liquid.	—	Death by meningitis.	Ue. die Krankheit. d. Thränenorgane, Wien, 1803.
2	Schmidt.	—	Female.	1802	—	One.	One daughter cyst.	—	Suppuration; perforation of the cornea, and prolapse of iris. Recovery 14 days after the operation V = o.	Ueber d. Krankheit. d. Thränenorgane, Wien, 1803, p. 94.
3	Delpèche.	25	Male.	1822	2 yrs.	One.	Clear liquid.	R.	Suppuration. Recovery in 15 days. Function of eye restored.	*Chir. Clin. de Montpellier*, 1828, t. ii., p. 99.
4	Lawrence.	42	Male.	1820	7 yrs.	Two.	One half teacupful of hydatids.	—	Suppuration. Recovery in 1 month. V = o.	Mackenzie on the Eye, Phila., 1855, p. 1006.
5	Holscher.	17	Male.	1832	1½yrs.	Three.	Two hydatid or daughter cysts.	R.	Intense reaction; suppuration; fever. Recovery in 2 months and 3 days. V?	*Caspar's Wochenschrift.*, 1833, vol. i., p. 237.
6	Tavignot.	4½	—	1848	3 mos.	One.	Twenty daughter cysts.	—	Panophthalmitis; phthisis bulbi.	*Jour. des Connaissances M dico-chir.*, 1848, t. xxi., p. 12.
7	Weldon.	—	Female.	1806	2 yrs.	One.	One daughter cyst.	—	Suppuration. Recovery in 3 weeks. V = o.	"Cases and Demonstrations in Surgery," Lond., 1806, p. 104.
8	Goyrand.	—	Child.	1843	—	One.	One daughter cyst.	—	Recovery. V?	*Annal. d. l. Chirurg. Franç. et Etrang.*, vol. viii.
9	Dornblüth.	22	Female.	1841	1 yr.	One.	Clear liquid.	L.	Suppuration. Recovery. V = o.	*Oppenheim's Zeitschrift*, 1843, vol. xxi., p. 1.
10	Gracia Romeral.	16	Female.	1844	—	One.	One daughter cyst.	L.	Suppuration. Recovery after erysipelas. V = $\frac{20}{30}$.	*Gaz. d. Hôpitaux*, 1854, p. 514.
11	Bowman.	20	Male.	1852	3 yrs.	One.	Three daughter cysts.	—	Suppuration; phthisis bulbi.	Mackenzie on the Eye, Phila., 1855, p. 1,007.

No.	Author.	Age.	Sex.	Date.	Duration of Disease.	No. of Operations.	Contents of Cyst.	Eye.	Results and Remarks.	Original References.
12	Ansiaux.	8	Male.	1846	6 mos.	One.	One daughter cyst.	L.	Suppuration. Complete recovery. V ?	*Gaz. des Hôpitaux*, 1854, p. 514.
13	Goyrand.	11	—	1828	2 yrs.	One.	One daughter cyst.	L.	Suppuration. Recovery with fair vision.	*Annal. d. Chirurg. Franç. et Etrang.*, vol. viii., p. 475.
14	Hulke.	—	Male.	1862	—	One.	One daughter cyst.	—	Suppuration. Recovery. V = $\frac{1}{100}$.	*Lond. Ophthal. Hospt. Reports*, 1865, p. 91.
15	Carathéodori.	14	—	1860	7 mos.	Two.	Clear liquid.	—	Erysipelas; suppuration. Recovery. Vision good.	*Gaz. d'Orient.*, 1860, t. iv., p. 9.
16	Waldhauer.	37	Male.	1864	2 yrs.	Two.	A large number of daughter cysts.	R.	Suppuration; enucleation. Recovery.	Ophth. Congress, Sept. 5, 1865.
17	Desmarres.	Girl.	Female.	1874	—	One.	A number of daughter cysts.	L.	Suppuration. Recovery.	Leçons cliniques s. l. chirurg. oculaire, 1874, p. 341.
18	Dudon.	38	Male.	1877	2–3 yrs.	Two.	One daughter cyst.	R.	Suppuration. Recovery in 12 days. Cyst in Tenon's capsule, V ?.	*Memoires d. l. Société d. Médecine d. Bordeaux*, 1877, p. 432.
19	MacGillivray	—	—	1866	6 yrs.	One.	Nine daughter cysts.	—	Recovery, V = $\frac{1}{2}$.	*Annal. d'Oculistique*, 1866, p. 172.
20	Billroth.	6	Male.	1872	2 yrs.	Two.	One daughter cyst.	L.	Suppuration. Recovery with fair vision.	*Chirurg. klin.*, Berlin, 1879, p. 101.
21	Verdalle.	25	Male.	1872	—	One.	Seven to nine daughter cysts.	R.	Suppuration. Recovery. Phthisis bulbi before development of cyst.	*Bordeaux Médical*, 1872, t. i., p. 226.
22	Bresgen.	15	Male.	1874	6 wks.	Two.	One daughter cyst.	R.	Slough of cornea; prolapse of iris. Death by meningitis.	*Berl. klin. Woch.*, 1874, p. 381.
23	Lawson.	29	Male.	1872	8 mos.	Two.	Three daughter cysts.	L.	Suppuration. Recovery in 1 week. V = $\frac{20}{200}$.	*Lond. Lancet*, 1876, vol. i., p. 570.
24	Westphal.	17	Male.	1872	9 mos.	Two.	Nineteen daughter cysts.	R.	Suppuration. Recovery. Tumor extended from the brain to the orbit. V = 0.	*Berl. klin. Woch.*, 1872, p. 205.
25	Higgins.	14	Female.	1876	—	Two.	Clear fluid.	R.	Suppuration after second operation. Vision fair.	*Lond. Lancet*, 1876, vol. ii., p. 576.
26	Morella.	Adult.	Female.	1876	—	Two.	Clear fluid.	L.	Suppuration after second operation. Recovery. V = 0.	*Revista Clin. e Therapeu.*, Napoli, 1882.
27	de la Peña.	Adult.	Male.	1879	—	One.	Clear fluid.	—	Suppuration. Sec. glaucoma. Recovery in 24 days. V = 0.	*La Oftal. Practica*, 1882, p. 6–12.
28	Hardy.	22	Female.	1879	3 yrs.	One.	Six to seven daughter cysts.	L.	Recovery. V = 0.	*Australian M. J.*, Melbourne, 1879, p. 589.
29	Dieu.	20	Female.	1883	6 mos.	Two.	One daughter cyst.	—	Suppuration. Recovery in 1 month. Atrophy optic nerve. V = 0.	*Rec. d'Ophthal.*, 1884, p. 22.
30	Mules.	6	Male.	1882	4 wks.	Two.	One daughter cyst.	R.	Suppuration. Recovery. V = $\frac{20}{30}$.	*Trans. Oph. Soc. United Kingdom*, 1883, vol. iii., p. 22.
31	Zehender.	38	Male.	1886	8 wks.	Three.	One daughter cyst.	R.	Suppuration after second operation. Recovery. Vision fair.	*Monatsbl. f. Augenheil.*, 1887, vol. xxv., p. 333.
32	Weeks.	22	Male.	1888	8 days	One.	Seven daughter cysts.	R.	Suppuration. Recovery in 2 weeks. V. good.	Arch. of Ophth., xviii., p. 31.

Conclusion.

There is of course no reason why echinococcus cysts should not occur in any part of the body where the diameter of the arteries is more than the $\frac{1}{400}$ of an inch, since this is about the diameter of the proscolex of the tenia echinococcus hominis. Echinococcus cysts have been found in the liver, spleen, lungs, brain, cord, muscle tissue, osseous tissue, and subcutaneous tissue. They have never been seen in the interior of the eye. The cyst may be simple, as observed by Mules (Case 30), or it may contain a large number of daughter cysts, as in the case by Lawrence (Case 4).

Stellwag holds that the upper inner angle is the place of selection for the development of hydatid cysts in the orbit. However, this is contrary to the facts, as they have been observed equally as often in other parts.

The growth of the echinococcus cyst is usually very slow. In a case reported by MacGillivray (Case 19), the tumor was under observation six years before operative procedures were instituted. In the case described by the author, the tumor had been noticed but eight days before the operation.

The following symptoms have been observed: Pressure-pain in the eye, orbit, or corresponding side of head; delirium, fever, chills, secondary glaucoma, loss of mobility, exophthalmus, diplopia, neuritis, loss of vision in varying degree. Fever occurs only when suppuration is taking place, disastrous results occurring almost always where operative procedure was not instituted in the early stages of the development of the tumor. Partial or total atrophy of the optic nerve; partial loss of mobility, sloughing of cornea, panophthalmitis, death (Cases 1 and 22).

Diagnostic points.—Pressure-pains referable to back part of the eye, or to the temporal region, usually most severe at night. Slow progressive development of exophthalmus. Absence of fever. The presence of a firm, elastic, obscurely fluctuating, sometimes trembling tumor projecting from any part of the orbit; if connected with the brain, pulsation may be noticed; if on puncture with an aspiration-needle, some clear fluid is drawn off, found to be devoid of

albumen, but rich in sodium chloride (nitrate-of-silver test), the diagnosis of hydatid cyst is positive, even without finding hooklets, since the contents of all other cystic tumors are albuminous.

Radical operative procedure should be resorted to immediately on confirming the diagnosis, whether the tumor is confined to the orbit or not. Total extirpation when practicable, or complete evacuation of the cyst, and the encouragement of a process to destroy the genetic membrane, as the insertion of a drainage-tube and the production of a mild process of suppuration, should be resorted to. In all cases where simple puncture, resulting in evacuation of the liquid, has been done, the cyst has refilled. In all cases where a suppurative process, without removal of the cyst wall, but thorough removal of its contents, has taken place, rapid recovery has followed.

ON CHOKED DISC AND ŒDEMA OF THE OPTIC-NERVE TRUNK.[1]

By Dr. RICHARD ULRICH, of Strassburg.

Translated by James A. Spalding, Portland, Maine.

(*With one wood-cut.*)

Case 1.—Mrs. M. B., æt. 39, June 22, 1881; has suffered from more or less constant headache since August; much worse during the last two months; diplopia, and within the last two weeks vomiting.

June 23d.—Ophthalmoscopic picture normal.

July 6th.—Very violent and constant headache since previous date, uninterrupted moaning, and frequent vomiting. Ophthalmoscope reveals double fresh papillitis with large extravasations of blood, margins of papilla obscure, haziness around papilla, and tortuous vessels. Paresis of the right abducens.

July 18th.—General condition the same; margins of papillæ indistinct, papilla itself swollen on the inner side; veins moderately full and tortuous, hidden from sight as they pass from the papilla; striped hemorrhages near and above papilla. Both eyes alike. Diplopia.

July 22d.—Patient had to be isolated, as she disturbed the other patients with her screams.

July 28th.—Increased retinal hemorrhages; and—left eye—thread-like vitreous opacities.

August 8th.—Sudden death.

Post-mortem examination.—Brain: Dura mater tense, convolutions flattened, and their surface dry. Infundibulum bulging forward; ventricles widely distended, and filled with a clear fluid.

[1] The original of this paper appeared in No. 3 of vol. xvii. of the German edition, issued November 29, 1886.—(H. K.)

Consistency of brain reduced, moist; and the corpora quadrigemina and right half of cerebellum very much softened. In the latter a walnut-sized cystoid tumor.

Numerous hemorrhages around left papilla; no noticeable prominence of papilla. Hemorrhages in right retina.

The eyes were immersed in Müller's solution and then in alcohol and finally imbedded in celloidin.

Left eye: Longitudinal section through end of optic nerve and papilla.

Intervaginal space closed by adherence of pial and dural sheaths; nothing abnormal in these sheaths; papilla swollen, central excavation. The layer of nerve fibres measures 0.8 *mm* at the margin of the choroidal foramen, projects in characteristic way over the edge of the choroid, and crowds to one side the external retinal layers.

The three causes in producing the swollen papilla are:

1. Excessive hyperæmia in the large and small veins and capillaries, which are dilated and full of blood. Around the smaller veins, and mostly enclosing them as it were in a sheath, we find an accumulation of leukocytes and red blood-corpuscles. The infiltration with the latter is more diffuse yet thinner toward the surface of the papilla. Moderate extravasations beyond the papilla, partly in the upper surface of the layer of nerve fibres, and partly in the granular and intergranular layers. In the latter they are of a cystoid character, have broken through the limitans externa and the well-preserved rods and cones, and spread out on the outer side of the latter. The extravasations extend 2PD into the retina.

2. The *serous infiltration of the substance of the papilla contributes materially to the swelling.* The nerve-fibre bundles are pressed apart, partly by finely granular material, partly by accumulations of small hyaline drop-like balls or larger roundish structures with finely granular contents interspersed with red blood-corpuscles.

3. The hypertrophy of the nerve fibres, which is seen as well in the neuritic thickening as more noticeably near the surface of the layer of nerve fibres and close to the papillary margin.

All of these alterations are this side of the lamina cribrosa, and since the bundles of nerve fibres as well as the connective-tissue support of the nerve seem absolutely normal, one would have said that the optic-nerve trunk was perfectly healthy, had we not noticed in longitudinal sections, that the bundles of nerve fibres

were separated from the connective tissue by remarkably wide interstices. To this loosening of the nerve tissue we owe it that in fine sections the bundles show a great tendency to fall out. Transverse sections give us a clearer idea of this by showing that the normal lymph-spaces are excessively enlarged and nearly filled with a crumbling mass, like the coagulation of a richly albuminous fluid. We find a more extensive collection of such materials in sections at the inner side of the upraised pial sheath, and then again near the axial connective-tissue cord.

The dilatation of the lymph-spaces of the optic nerve was followed up as far as the osseous optic canal, but unfortunately at this spot it was not investigated at all.

The condition in the right eye was precisely similar to that in the left.

Case 2.—Mr. M., æt. 43, has suffered for six months with headache, loss of memory, apathy, and lately occasional vomiting.

January 5, 1885.—Reads common type with either eye, and has not observed any decrease in vision.

Both papillæ reddened, contours ill-defined, and veins rather full.

January 16th.—General health as before, but the headache and vomiting are more excessive; no complaint about the eyes or vision.

R. E.: Haziness of papilla more marked; thready hemorrhages inward from papilla; veins twice as thick as the arteries, and tortuous; inner and lower portion of papilla slightly elevated.

L. E.: Papilla hazy, prominent, grayish-red; veins enlarged, arteries rather thin. Vessels tortuous, and climbing with curves over the papilla into the retina. Above papilla a bright spot overlying a vessel, and below it a thick brush-like hemorrhage.

January 28th.—Papillæ as before, outer halves normal, a few fresh hemorrhages into left retina.

It was undeniable that the process had come to a standstill and was even retrograding in the right eye, whilst the attendant physician thought that there were less marked symptoms of cerebral pressure than before.

February 16th.—Sudden death.

Autopsy.—Tumor in left parietal lobe, walls of left lateral ventricle nearly united, and abundance of liquid in the left posterior horn and right lateral ventricle. Cerebral œdema difficult to prove, as the corpse was three days old.

Right optic nerve with posterior portion of sclera removed.

Examination of eye : The eye was hardened in Müller's solution and alcohol, and imbedded in celloidin. Longitudinal sections through the peripheral portion of the nerve and papilla showed that the apparent swelling of the papilla was not present anatomically, whilst the thickness of the layer of nerve fibres was entirely physiological. Nor was there any histological sign of papillitis.

Veins and arteries overflowing with blood, so that in the papilla we see far more than the average normal number of vascular cross-sections, small hemorrhages, slight serous infiltrations.

This case, then, briefly reported, is as follows: In a man of forty, who had suffered for a long time with ill-defined cerebral symptoms, we find at the first ophthalmoscopic examination so slight an alteration in the optic papilla that an accurate diagnosis is impossible. Eleven days later, whilst the cerebral symptoms have increased in intensity, we find a distinct papillitis, with but slight swelling, but nevertheless with well defined congestion of the veins, and hemorrhages. During the next three weeks the general health and the ophthalmoscopic picture remain at a stand-still. Three weeks later, death without any apparent loss of sight.

The autopsy shows tumor in left parietal lobe, walls of left lateral ventricle partially united, large quantity of liquid in the right lateral ventricle and the left posterior horn (*hydrocephalus internus*). Right eye : slight papillitis (venous hyperæmia, hemorrhagic extravasations, etc.), œdema of the optic-nerve trunk, with compression of the central vessels, and a little liquid in the ocular end of the intervaginal space.

Case 3.—Marie E., æt. 32, August 1, 1885. Has suffered from constant and gradually increasing headache, ever since May 1st, and within the last three weeks she has vomited regularly once or twice daily. The headache assumed a paroxysmal character in July, and has at times been so violent that the patient lost consciousness, and often shrieked aloud. This condition persisted, with variations, till death in September. The patient never complained of her sight, and saw well enough to read up to the day of her death, whilst the pupils were of normal diameter, and reacted well to the light.

Ophthalmoscopic examination.—Left eye, August 1st : upper and lower margin of papilla indistinct, papilla slightly reddened, arteries normal, veins enlarged and tortuous ; a few spindle-shaped hemorrhages upon the papilla and close around it.

R. E.: Same as left, though less defined.

August 14th.—Left eye: papilla vividly red, margins indistinct, covered with a gray zone, which entirely surrounds the papilla, and terminates rather suddenly, though not sharply defined, against the surrounding tissue; numerous striped and irregular hemorrhages lie within this zone. Arteries normal, veins enlarged and tortuous, papilla prominent, with central excavation. On exercising pressure upon the eye, the end of the vein within the excavation suddenly grows pallid, and venous pulsation is observed.

Right eye: Similar appearances.

September 8th.—Right eye: numerous radiating hemorrhages around the papilla, whilst above and below they have united into zonular patches. Arteries very thin; papilla moderately red.

Left eye: Arteries extremely thin, but hemorrhages less abundant.

Autopsy.—September 23d. Gyri somewhat flattened, especially in left hemisphere, and the veins in the temporal lobe nearly empty. Left side of cerebrum more convex than right. Lateral ventricles dilated. Tumor of left optic thalamus extending 1 *cm* beyond median line to the right. The eyes were hardened in Müller's solution and alcohol, and imbedded in celloidin.

The left eye was used for consecutive transverse sections of the optic nerve, beginning in the lamina cribrosa and ending at the optic canal. Longitudinal sections at the papilla only.

The latter showed the characteristic choked disc to a moderate degree. The layer of nerve fibres was 0.6 *mm* thick near the choroidal foramen, and thence decreased rapidly. Bundles of nerve fibres seem pressed apart, and look like coarse mesh-work. Small vessels engorged with blood, central vessels surrounded with bright halos. Œdema of the adventitia. Extensive extravasations in the layer of nerve fibres, smaller ones in the intergranular layer, up to about 1 or 2 *mm* from the papilla. Intergranular layer has a cystoid appearance, and contains over a space of 2 *mm* into the retina; glittering drop-like masses and granular globules, as well as small amorphous exudations.

Hypertrophic nerve fibres are seen here and there, and especially where the bundles projected forward over the edge of the choroidal foramen, and pushed the external retinal layers aside.

The cellular tissues of the papilla are only increased round about the smaller veins and capillaries, where we also see a distinct

œdema. The hemorrhages also in the papilla follow quite accurately the course of the vessels.

Transverse sections of the optic-nerve trunk:

1. In the lamina cribrosa the central vessels appear gaping, the adventitia of the vessels widened and œdematous. The fissures in the lamina are not wholly filled with bundles of nerve fibres, but rather the latter are separated from the supporting tissues by broadish interspaces, some of which are empty, others filled with a granular exudate. Transverse sections of the non-medullated nerve-fibre bundles contain a remarkably large number of bright fissures.

2. Transverse sections just below the lamina show hydrops of the optic-nerve sheaths. The dural sheath stands $\frac{1}{2}$ to $\frac{3}{4}$ *mm* from the pial sheath; the intervaginal supporting tissue is pulled asunder, chiefly toward the dural sheath; between the beams, and attached to them, is a finely granular material with granular globes and numerous lymph corpuscles, or even large cells. The latter contain a finely granular protoplasm; a few exhibit the shape of a seal ring; between some of them are corpora amylacea. The tissues of the central connective cord seem loosened and œdematous, and the central vessels of the optic nerve compressed, so that the calibre will hardly admit from one to three corpuscles, whilst the walls of the veins touch one another. The bundles of nerve fibres and the supporting tissue are related as in 1.

3. The hydrops intervaginalis remains unaltered as far as the entrance of the central vessels into the optic-nerve trunk, but from there onward the two sheaths approach one another until they lie in close contact; the nerve sheaths themselves are normal. The central vein remains compressed in the whole of its intraneural course.

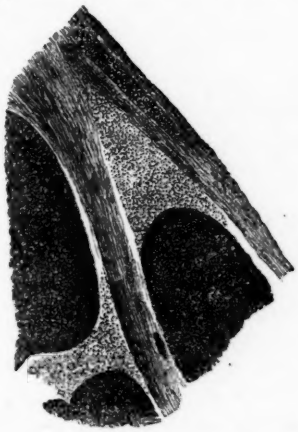
The interstitial œdema of the nerve is extraordinarily pronounced in this section. It is not only that the bundles of nerve fibres are surrounded, as previously described, by broad borders of exudation, in which there is a great deal of myeline, but the œdema extends into the interior of the chief bundle between the so-called secondary bundles, separating these by brilliant interspaces, which contain the swollen connective-tissue beams. Finally, the pial sheath is, at many localities, elevated (interfascicular, intrafascicular, and sub-pial œdema).

4. The œdema decreases in quantity toward the bony optic canal, but does not wholly disappear.

There is nothing abnormal in the nerve fibres or supporting tissue of the optic nerve, excepting free myeline.

Right eye: thickness of nerve-fibre layer at edge of choroidal foramen, 0.68 *mm;* microscopic condition of papilla like that of left eye, excepting the nests of nerve fibres, swollen like ninepins, which here are evenly thickened. Much hæmatoidin, with fresh hemorrhages in the nerve tissue.

The intervaginal space is scarcely dilated at the bulbar end; 4 *mm* behind the lamina cribrosa, the dural sheath lies against the pial; the small amount of liquid as in the left eye.



The œdema (compare the accompanying sketch) in this case also is inter- and intra-fascicular as well as sub-pial, but additionally it extends with the central connective-tissue column (which is itself œdematous) through the lamina cribrosa as far as the excavation in the papilla, and thence for quite a distance along the retina beneath the hyaloid. The central vessels are compressed into a slit shape during their course within the nerve trunk, but they dilate and contain a great deal of blood near the lamina cribrosa.

Résumé: A strong and healthy girl of thirty-two is attacked with a central brain disease, which introduces itself with well defined and gradually increasing symptoms of cerebral pressure, and terminates fatally in four months. Seven weeks before the patient died a slight papillitis is discovered, with moderate

swelling but distinct congestion of the veins. The swelling of the papilla, tortuosity of the veins, and hemorrhagic extravasations gradually increase, and then maintain themselves at a certain height; the arteries become very thin. Fourteen days after the last ophthalmoscopic examination the patient dies; vision never affected.

The autopsy shows flattening of the gyri, hydrocephalus internus, tumor of the optic thalamus.

Examination of the eyes shows: œdema and hemorrhages in the papilla, with turgescent veins and capillaries; in the nerve trunk, hydrops intervaginalis (left), œdema of the optic nerve, slightest at the bony optic canal, and from that spot increasing and extending as far as the excavation in the papilla, and thence under the vitreous; central vessels compressed and empty of blood as far as the lamina cribrosa, but there normal. Nerve fibres normal, but abundance of myeline lying between the bundles.

REMARKS.

Although a great many cases of choked disc have been published, numerous gaps still exist in a pathogenetic point of view; there is still a painful lack of fresh cases carefully observed at the bedside and afterward anatomically examined. Choked disc is a chronic morbid process whose original ophthalmoscopic appearance can be rendered totally irrecognizable, either clinically or anatomically, by secondary processes. I shall, therefore, in discussing the origin of choked disc, confine myself exclusively to the three cases above described, the character of which, as fresh cases of this disease, cannot be denied when we consider the symptoms in the papillary vessels and the accompanying cerebral tumors, although they really do not exhibit the classical picture of the thoroughly developed morbid process.

These three observations both clinically and anatomically demonstrate that stasis- or congestive œdema, causes the alterations in the papilla.

The hyperæmia of the veins, visible ophthalmoscopically as well as microscopically, the anatomical demonstration of the capillaries overflowing with blood, the hemorrhages, and the slight accumulations of leukocytes around about the vessels, are all symptomatic of stasis-œdema, which, in its

turn, was indubitably proved to be a collection of serum in the fissures of the tissues.

Hypertrophy of the nerve fibres has been regarded by many as a simple process of swelling. And, at all events, we have not, as yet, obtained any facts which compel us to explain this alteration as an inflammation or a retention of lymph, with subsequent chemical alterations.[1] Face to face with these symptoms of venous congestion known for so long a time, it would seem extraordinarily forced were we to assume for the œdema of the papilla another source than for the extravasations, the relation of which to the congested blood-vessels is plain to everybody who is not prejudiced. Therefore it is really astounding when Parinaud,[2] who, as we see from his papers, has, both clinically and anatomically, studied the choked disc, denies that in the course of papillitis there is any congestion of blood *ex stasi*. He agrees, indeed, that the primary alteration in choked disc is an œdema, but he affirms that it is due to a stasis of lymph, in precisely the same fashion as the cerebral œdema which is simultaneously present. He supports his opinion with the argument that the ophthalmoscope in the incipient stages of choked disc shows œdema of the disc without any dilatation of the veins. Unfortunately, my observations do not coincide with Parinaud's assertions. In a few cases of choked disc with cerebral tumor, where the ophthalmoscopic alterations were so slight that they offered no help for us to decide whether the condition was necessarily pathological or not, I never failed to see the turbidity of the tissues and tortuosity of the veins, and for that reason, and in agreement with the large majority of specialists in this province, I cannot but regard venous hyperæmia as a certain and an early symptom of choked disc. But even if we were to acknowledge that Parinaud is perfectly correct so far as his observations go, yet they would not authorize us to deny that the venous stasis appears so early in the development of the choked disc, and later plays so over-

[1] Compare Kuhnt, *Graefe's Archiv*, Bd. xxv., 3, p. 261.

[2] Parinaud: De la névrite optique dans les affections cérébrales. *Annal. d'Oculist.*, 1882.

powering a rôle in the ophthalmoscopic picture, that, from the beginning, it has been correctly regarded as the basis of the entire process, and, indeed, gave it the name.

Œdema of the nerve trunk bears an entirely different character, at least as it presents itself in the cases above described.

For this I can only provisionally affirm, that it does not exhibit stasis-œdema in so far as alterations in the veins and capillaries, resp. hemorrhages, etc., are not found in the nerve trunk.

Of what nature, then, is this process?

The first and most natural idea is that the œdema is conducted from the optic papilla outward, and all the more as it seemed to decrease in quantity as we went farther backward. But this idea had to be abandoned when further investigations showed that the œdema of the optic-nerve stem did not appear exclusively in choked disc; but additionally in cases of tubercular meningitis in which the papilla appeared absolutely normal.

If we were next to imagine that the œdema arises from liquid being forced into the nerve from the dilated intervaginal space (a method of procedure which the supporters of the transportation theory suggest), then we should be opposed by the fact that in the majority of cases the œdema in question is found without any intervaginal hydrops.

Under these circumstances I am driven by exclusion to the apparently true supposition that the brain is to be regarded as the source from which the œdema arises, and is forced along from the central end of the optic-nerve trunk.

Owing to lack of experience I can neither affirm nor deny Parinaud's assertion that cerebral œdema is a constant accompaniment of tumors or attacks of meningitis which are complicated with œdema of the optic nerve. At all events the condition is frequent, and although it is not invariably mentioned in the reports of autopsies, yet this may be owing to the difficulty of discovering a condition which is transient in life and changeable after death.

The œdema is confined entirely to the normal or more or

less dilated lymph-canals of the nerve. Whenever, as has happened also in cases of meningitis, it decreases in quantity in the region of the bony optic canal, this does not in any way contradict the idea of an extension from the brain. We know well enough from other portions of the human body, that the amount and the extent of an œdematous swelling depends largely upon the distending capacity that the tissue affected possesses; and there is not a doubt that this capacity at the summit of the orbital canal, where the nerve is closely confined within the bone, is much less than near the eyeball, where it rests amidst the loose orbital connective tissue.

This view seems all the more probable to me owing to the fact that it explains more satisfactorily the occurrence of intervaginal hydrops, which is an undeniable symptom with cerebral tumor, and a frequent though not a constant one in meningitis, and brings it more into harmony with experimental and anatomical facts than the transportation theory in its present form has yet been able to do.

The transportation theory assumes that the liquid in the intervaginal space originates from the subarachnoidal space of the brain, and from thence penetrates into the lamina cribrosa. There is no doubt that liquid may push forward from the subarachnoidal space of the brain into the intervaginal space of the optic nerve, and we may even grant that in parenchymatous hemorrhages this propagation actually takes place. But in reply we assert that in brain tumors the surface of the brain is almost always remarkably dry, whilst on the contrary the ventricles are distended with liquid. Now it is quite correct that under normal circumstances the ventricles are in communication with the subarachnoidal space; but leaving aside the difficulty of explaining with such an open communication the dilatation of the ventricles and the bulging of the infundibulum,[1] there remains the disagreeable circumstance that we are assuming that a liquid flows from A to B, whilst in reality no liquid has ever yet been found in A.

[1] Prof. v. Recklinghausen is of the opinion that in brain tumors only the lateral and third ventricles are filled with fluid, whilst the communication with the fourth ventricle and consequently with the subarachnoidal space, is interrupted.

The transportation theory meets with another difficulty, in being forced to assume that the liquid makes its way from the intervaginal space into the optic nerve, whilst experimental injections favor the inverse direction (Schwalbe). If, now, Manz correctly remarks, that, simply because granular coloring matters do not penetrate from the intervaginal space into the papilla, we cannot assume that watery fluids will act in the same way, yet it will surely be granted that those paths which the coloring matters do take will be the ones the more accessible to the liquids.

However, all these are but slight objections, which disappear face to face with the serious objection that hydrops intervaginalis is by no means a constant condition in choked disc, whilst on the contrary it is not at all uncommon without choked disc.

The reports of cases of choked disc, without dilatation of the intervaginal space, have gradually increased to such an extent that they cannot be simply ignored. Treitel,[1] Rosenbach,[2] Rothmund and Schweninger,[3] Uschakow,[4] and Parinaud (*l. c.*) have published such observations, to which mine may be added as the last.

In the earlier publications of this sort an attempt was made to explain the hydrops by the omission of a preliminary ligature of the nerve. If this objection is now silenced it is because we have learned that such a ligature is entirely needless. Remarks on this point have already been made by Treitel and Perinaud. I have seen several cases of hydrops intervaginalis (in retinitis albuminurica, miningitis, etc.), in which the dural sheath was inadvertently divided close to the globe in the removal of the eye. After hardening in Müller's solution, the dilatation of the intervaginal space of these eyes was quite as distinct as in their uninjured partners, which had been dissected out of the orbit with the optic nerve as far as the optic foramen. If we proceed in this manner there is no need of ligating the optic nerve, for there is no possibility of the intervaginal

[1] *Graefe's Archiv*, Bd. xxvi., 3, p. 105.
[2] *Graefe's Archiv*, Bd. xviii., 1, p. 31.
[3] *Zehender's Monatsblat.*, 1873.
[4] *Annalen der chirurg. Gess. zu Moskau*, 1875.

liquid escaping, to say nothing of the contraction of the dural sheath.

Therefore, the supporters of the transportation theory must for better or worse make up their minds to the fact that intervaginal hydrops is not necessary for the presence of choked disc.

Simpler far are the facts from our point of view, that the œdema of the optic-nerve trunk is conducted directly from the brain. Just as with long-continued parenchymatous injections into the optic nerve the liquid in the neighborhood of the globe is forced into the intervaginal space, so would hydrops intervaginalis be secondarily associated with optic-nerve œdema. Then all of the difficulties attendant upon the transportation theory would at once disappear, and the only question left for us to investigate and explain would be the cause of the venous stasis in the papilla.

The fact long since discovered with the ophthalmoscope, that hyperæmia of the retinal veins is generally accompanied with a diminution in the calibre of the arteries, compelled all observers to conclude that both appearances must have a common cause, and for that reason v. Graefe suggested that both sets of vessels must be subjected to compression within the lamina cribrosa. This hypothesis has been repeated *ad infinitum* ever since, but it has never yet obtained a single anatomical proof,—nay, in the only case in which in the anatomical description especial care was paid to this very point, the author (Rosenbach)[1] remarks that neither artery nor vein showed any constriction in passing through the scleral ring.

Furthermore, we have reports of choked disc in orbital tumors, and here the observers would not have hesitated to see the cause of the choked disc in the direct compression of the nerve and its central vessels by the tumor itself.

It seems to me, on the whole, that the conditions of choked disc must be analogous to this latter process.

The anatomical investigation of the three cases of fresh choked disc has revealed that the central vessels collapse and are empty during their entire course within the optic

[1] *L. c.*

nerve, whilst, on the contrary, in the lamina cribrosa they again expand. After this there was nothing to do but examine whether this condition of the vessels was something abnormal, something peculiar to the choked disc itself, or whether it was on the whole a frequent post-mortem condition.

In this point of view I found alone in Schwalbe[1] the emphatic remark that the channel of the central artery varies but slightly from the circular form, whilst that of the vein is generally irregular and more or less collapsed. Other anatomists fail to mention the point, and I therefore felt that I must investigate it more particularly.

I therefore examined a number of normal eyes (the cause of death being unknown to me), together with the eyes of two persons who had died of hemorrhage, of dogs dying in the same way, one case of retinal hemorrhage in anæmia, several cases of retinitis albuminurica, two of cerebral tumor without ophthalmoscopic alterations, two of cerebral tumor with optic atrophy after papillitis, and two of optic-nerve œdema in tuberculous meningitis without any papillary disease. I found Schwalbe's assertion confirmed throughout, and therefore there is no reason to see any thing abnormal in the condition of the central artery in the three reported cases of choked disc. Nevertheless it is undeniable that the condition in a dead eye is to be considered with much reserve so far as concerns the condition during life. The ophthalmoscopic condition, to be sure, teaches us that the circulation is never completely interrupted in choked disc, and it would therefore be a great error to desire to draw any such conclusion from the anatomical conditions. We have much rather to assume that the total occlusion of the vessels occurs first in the death gasp, when with sinking blood-pressure the vascular walls of the vasa centralia are no longer capable of offering a sufficient resistance to the increased intraneural pressure. And yet, after all, this post-mortem condition of the vessels is a valuable confirmation of the hypothesis, long since borrowed from the ophthalmoscopic picture, that beyond the papilla

[1] *Graefe-Saemisch.*, Bd. i., p. 345.

exists some circulatory obstacle common to both the central artery and vein.

There is so much the less need for me to go into detailed proof that this circulatory disturbance is produced by the œdema of the optic-nerve trunk, in so far as it increases the intraneural tension and exercises a more or less forcible pressure upon the central vessels, since precisely analogous conditions are known in the brain. I consider in my three cases that œdema of the nerve trunk is the fundamental cause of the choked disc, and leave it to later investigations to decide how broadly this assertion can be generalized.[1]

We may here recall a peculiarity of the choked disc, which caused Parinaud to doubt the theory of stasis œdema. He asks how it happens that the œdema is limited to the papilla, and close around it, instead of affecting the entire retina, as we should expect if an obstacle to the circulation in the trunk of the vena centralis is the ultimate cause of the entire process. But he leaves entirely out of account the circumstance that, with a circulatory obstacle in the vein, the same obstruction exists in the artery, and that step by step with the increase of venous congestion the arterial supply must be diminished by compression of the artery. Now the arterial anæmia thus produced chiefly affects the retina, because the papilla is partly supplied with blood from the choroid and the circular artery of Zinn. In this way it may happen that the œdema in genuine cases of choked disc confines itself chiefly to the papilla. Perhaps, too, the matter lies thus, that when the central artery is greatly affected in pronounced œdematous swelling of the optic nerve, we find a peculiarly circumscribed choked disc, whilst with a slighter degree of œdema of the optic nerve, the venous escape alone will be easily obstructed, whilst the arterial circulation remains relatively intact, so that the symptoms of congestion are less intense, but at the same time much more extensive—in other words, that instead of genuine choked disc we find papillo-retinitis.

It seems to me that we have still another question to

[1] In subsequent investigations the chief stress should be placed upon an anatomical investigation of the choked disc during the stage of increased swelling.

answer, and one even more difficult than that of Parinaud, and which has pressed itself upon me during my anatomical investigations, and it is, whether optic-nerve œdema, leaving aside the sequences that have up to this time been discussed, may not injure in another and more direct manner the optic nerve in its course.

It has long been known that in cases of choked disc, the vision is extraordinarily independent of the alterations visible with the ophthalmoscope. We may say that at one time vision is totally lost and at another perfectly intact, and yet the papilla looks the same in each individual. Nevertheless the opinion most universally accepted is that leaving aside the so-called epileptiform amauroses, the sight in cases of cerebral tumors is destroyed because the gradual swelling of the papilla crushes the non-medullated nerve fibres. Published reports of autopsies seem to demonstrate that an especial papillitic atrophy occurs in an otherwise intact nerve trunk.

In opposition to this there are other observations which show that in cerebral tumors, the optic nerve may become diseased in its course quite independent of the papillitis. Thus Türck[1] found the optic-nerve fibres destroyed at the the chiasma, whilst they were intact in the optic nerve. Similar cases are reported by Böttcher,[2] Rosenbach,[3] and Leber.[4] And side by side with these anatomical conditions we have the well known clinical experience that blindness can ensue upon meningitis without any visible alterations in the papilla, an experience on which I lay all the more stress since I suspect that it is in meningitis that optic-nerve œdema will be the most frequently discovered.

These considerations have already raised doubts in regard to the doctrine of ascending atrophy, as just now universally accepted, and if I array myself on this side, it is chiefly on account of the testimony of my own observations of simultaneous disseminate degeneration of the nerve substance in optic nerves, together with œdema of the nerve itself.

I have already remarked in describing the latter, that

[1] *Zeitsch. der Gess. der Aertzte in Wien*, Bd. viii., p. 297.
[2] These ARCHIVES, iii., 1, 134.
[3] *L. c.* [4] *Graefe's Archiv*, Bd. xiv., 3, p. 333.

much free myeline was present in the coagulated œdema liquid surrounding the bundles of nerve fibres; indeed it was not to be denied that in some spots the bundles looked as if they had been gnawed, so that here the nerve medulla must have been partly destroyed. Particularly was this noted at the region of the foramen opticum in Case 3, where the bundles of nerve fibres, otherwise normal, appeared as if they were thickly sown with myeline.

I have also seen these masses of myeline in ligated optic nerves of dogs, and curiously enough both centrally and peripherally within two days after the ligation experiment. As the optic nerve of the second eye enucleated at the same time did not show these alterations, they were naturally to be referred to the mechanical destruction of the nerve fibres by the ligature.

The same condition was also observed in several cases of tuberculous meningitis, and these were the very ones which exhibited disseminated degeneration of the nerve substance at the optic foramen with simultaneous œdema of the nerve trunk.

After having once had my attention called to the latter coincidence, I have since found it a common occurrence. Besides in meningitis, I saw it in a case of papillo-retinitis, in tumor of the pons (but not examined during life), in a sarcoma of the left frontal lobe without any changes at the papilla, and in retinitis albuminurica.

I think that this disseminate degeneration has been repeatedly described by Leber in papillo-retinitis, in meningitis, in inflammation of the orbital tissue, and invariably in the more central portion of the nerve. It would therefore seem proper to turn upon this region the attention which has hitherto been attracted to alterations in the papilla. The place where the nerve passes through the optic foramen is evidently a critical one, and even v. Graefe repeatedly expressed the opinion that neuritic swelling at this point must act very deleteriously, owing to the counter-pressure of the parts.[1]

[1] We omit in the translation the description and discussion of experiments of ligating the optic nerves made by J. Stilling, the author, and others, because they yielded no available results as to the question under discussion.—(H. K).

In conclusion a few remarks on the literature of œdema of the trunk of the optic nerve may not be out of place.

It would indeed be astonishing if a condition which with some experience can be recognized with the naked eye at the transverse section of the optic nerve, should have hitherto been overlooked. This has not been the case, but it received no, or a wrong pathogenetic, consideration, probably because the simultaneous compression of the central vessels during their course in the nerve has not been noticed by anybody.

The earliest observation of œdema of the optic nerve was made by Stellwag[1] in albuminuria; he saw an hydropic swelling of the optic-nerve marrow.

Manz in his case of tuberculous meningitis[2] mentions, besides hydrops intervaginalis, sub-pial œdema of the optic nerve.

Herzog is the first to describe,[3] in a case of choked disc (cerebral tumor), the inter-fasicular œdema of the nerve. "The almost constant presence of broad free spaces between the nerve bundles and their connective-tissue envelopes leads to the supposition that during life there was liquid in these spaces."

J. Michel[4] expresses himself in a similar way.

Finally Poncet[5] gives an excellent drawing of optic-nerve œdema in a case of choked disc from cerebral tumor.

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[1] "Die Ophthalm. vom naturwiss. Standpunkt," vol. ii., p. 619.
[2] *Zehender's Mon.*, 1865.
[3] *Zehender's Mon.*, 1875.
[4] *Graefe's Archiv*, vol. xxiii., 2.
[5] "Atlas des Maladies de l'Œil par Poncet et Perrin," 1879, pl. 31, fig. 2.

ON CHOKED DISC AND CONSECUTIVE ATROPHY OF THE OPTIC NERVE.[1]

By Dr. RICHARD ULRICH, of Strassburg.

Translated by Dr. J. A. Spalding, Portland, Maine.

(*With plate iv, of vol. xviii., Germ. ed.*)

HAVING just described three cases of choked disc, accurately observed in their origin and course during life, and anatomically examined before the alterations at the papilla had reached their maximum, I now add three other cases in which the choked disc had begun to diminish, and in which the anatomical examination exhibited remarkable alterations in the optic-nerve trunk.

The first paper offered important evidence in regard to the origin of choked disc, and its connection with brain tumors, the second shall furnish a contribution to the origin of optic atrophy, which so often closes the scene after this affection at the papilla.

Case 1.—Peter P., æt. sixty-one, March 21, 1887, has occasionally suffered for some months with headache and sleeplessness; headache lately worse; weakness in arms and legs; no focal symptoms.

March 29th.—Ophthalmoscope shows both papillæ red, not prominent, ill-defined margins, numerous large hemorrhages; arteries bright but difficult to discern; veins hyperæmic.

During April, left hemiplegia, loss of memory, and in both eyes well marked choked disc.

The patient died May 30th; autopsy on the following day:

[1] This paper appeared in the German edition, vol xviii., No. 3, issued March, 1888.—H. K.

tumor of right optic thalamus with much softening of adjacent tissues; left lateral ventricle slight hydropsy; right empty. One or two tablespoonfuls of serous fluid at base of skull after removing brain, which outside the locality of the tumor is not œdematous. Both optic nerves show slight swelling close to the globe, dural sheath folded. The nerves were divided into fragments connected by bridges of the dural sheath and placed in osmic acid, and later in alcohol. Before imbedding in celloidin, the condition of the central vessels was studied in cross-sections; the veins appeared collapsed, the artery elliptical, and occasionally with the walls in contact.

Longitudinal sections at papilla and bit of nerve adjoining; papilla hardly shows a characteristic choked disc; the layer of nerve fibres rises but 0.48 *mm* above the choroidal foramen, so that the nerve-fibre ridge, which in well marked cases swells out over the scleral ring and pushes aside the external retinal layer, is absent. The substance of the papilla shows a coarse mesh-work, with a few foci of sclerosed nerve fibres, and hemorrhages; no increase of cells nor hyperæmia. It seems on the whole as if the papillary changes were diminishing. Lamina cribrosa normal, the bundles of nerve fibres traversing the fissures in the usual arrangement.

We notice at once in the medullated portion of the optic-nerve trunk, that the marginal nerve-fibre bundles are broken down and the usual longitudinal fibrous arrangement is lost, but supplied by black crumbs of myeline, irregular in form and varying in size. These degenerated bundles are separated from the pial sheath by a layer of untinted finely granular exudate (sub-pial œdema). This alteration disappears toward the axis of the nerve trunk; the bundles again assume a longitudinal arrangement, but in such a way that a few deposits of free myeline lie between them. The free myeline has imbibed the osmium so much more freely that the totally degenerated sub-pial nerve-fibre bundles seem blacker than those running axially. The nerve fibres are, moreover, varicose, especially in the central sections of the nerve trunk.

It is difficult to decide whether the marginal nerve-fibre bundles are more noticeably degenerated at one spot than another, between the globe and the chiasma.

I did not succeed in discovering any regular increase or decrease of degeneration toward the eye or the brain; that

at the chiasma was chiefly marginal and gave the impression of a simple atrophy of the nerve fibres; there was no trace of alterations in the connective-tissue stroma, or in the nerve sheaths.

Case 2.—Caroline W., æt. seven, October, 14, 1885; parents report the child suffered every two or three weeks with pain in forehead and vomiting; attacks daily since first of the month; three weeks ago two attacks of general convulsions with loss of consciousness lasting five minutes; isolated twitchings of fingers frequent.

January, 1886.—Loss of motion in right hand and foot; gait staggering, right hand trembles while she is eating.

January 19th.—Both papillæ prominent, very red, margins indistinct, surrounded with a light-gray turbidity; arteries thin; veins tortuous, and partially hidden by the swollen papilla; no hemorrhages.

May 21st.—About the same; well marked choked disc in both eyes.

Although the child could no longer stand alone and remained with intervals of consciousness in a state of apathy from slow increase of the disease, the ophthalmoscopic picture continued the same till

September 25th.—Tortuosity of vessels has decreased; haziness around papilla less dense, so that the margin is seen; papilla red in centre, normal at periphery; although the little patient could neither read nor write we thought that her sight remained good to the last, for she could easily count fingers across the wide room, and correctly name colors.

October 3d.—Death in coma.

Autopsy.—Tumor of cerebellum, enormous hydrocephalus internus; brain so soft that it tore on removal; convolutions pressed out of shape.

The posterior halves of the eyes with the optic nerves as far as the chiasma were removed, the dural sheath of the left nerve opened at about 2 *cm* from the globe, and in a cross-section made on the spot the orifice of the central artery was seen to be round.

The right untouched optic nerve seems rather thicker than the left, and slightly swollen near the globe. It was hardened twenty-six days in Müller's solution and then in osmic acid, whilst the left nerve was placed fresh in the acid, later hardened in alcohol, and imbedded in celloidin.

Right eye: mushroom papilla, swelling slight, chiefly due to sclerosis of the nerve fibres, characteristic ridge above choroidal foramen pushing retinal layers aside; numerous vessels in the section, and amorphous brown pigment, but no fresh hemorrhages; large steel-gray, finely granulated, ninepin-shaped structures partly in the papilla, and partly in sub-retinal space and adjacent granular layer; granules pressed toward papilla forming a diffuse irregular focus; septa of papillæ with moderate abundance of cells; retina shows sclerosis of nerve fibres; layer of rods and cones post-mortem alterations; choroid normal.

Longitudinal sections through papilla and small portion of nerve trunk show that the marginal nerve-fibre bundles have disappeared, whilst the axial exhibit the osmium coloring; between the fibres of the latter, black granules and larger crumbs.

Transverse sections show that this atrophy chiefly affects the bundles next to the pial sheath (Fig. 1). The degenerated portion is sickle-shaped, with the greatest breadth of the sickle near the globe, a little upward or upward and outward, whilst toward the brain it is a little upward and inward. The horns of the sickle embrace the nerve inward and outward, leaving only the lower portion of the circumference free. The atrophy is most extensive in the middle, between the lamina cribrosa and the entrance of the central vessels, where the base of the sickle is broadest and the horns though extremely narrow almost unite into a ring. Toward the foramen opticum the sickle grows thinner and the horns shorter. The definition of the atrophic portion against the axis of the optic nerve is very characteristic; the degenerated bundles never touch those that are normal; there is always an intermediate zone with partial atrophy, and a few clusters of nerve substance. This zone approaches more and more to the pial sheath as we advance toward the cerebral end of the nerve, so that finally the outermost bundles also cease to exhibit total atrophy.

Such, on the whole, is the plan of degeneration from the globe to the chiasma, as exhibited with the aid of osmic acid (Fig. 2).

The cross-section of the totally atrophic nerve-fibre bundles was but little smaller than normal, containing a fine mesh-work with numerous nuclei belonging to the neuroglial cells, but no trace of myeline. The nerve-fibre bundles evenly tinted with the osmium were far from normal; all around lay myeline, which must have been set free by the destruction of the medullary sheaths (Fig. 3).

Let us next turn to the question of the optic-nerve œdema mentioned in my previous paper. It presented itself in this case also under the threefold form of sub-pial, inter- and intra-fascicular œdema, very evenly spread over the course of the nerve, but behind the lamina cribrosa and the summit of the orbital infundibulum it was less distinct. It again preferred the neighborhood of the larger vessels; atrophic and relatively normal portions of the nerve were equally affected, and the liquid filled the normal but widely dilated lymph-spaces in the form of a finely granular material (Fig. 3).

Central vessels normal, but central column extremely œdematous at spots.

In the pial sheath near papilla, numerous blood-vessels filled with blood, and heaps of cells, which, with the septa of the connective-tissue stroma, penetrate into the nerves.

Intervaginal space dilated near the globe only, not extending above the entrance of the vessels; filled with the meshes of the intervaginal beams, and clinging thereto, a finely granular material. Between, lay cells larger than lymph corpuscles, and frequently with two nuclei.

Left eye so like the right that there is no need of repetitions.

If this state of affairs should ever be confirmed by further anatomical and ophthalmoscopical examinations of this rare form of choked disc, we might assent to the possibility that the œdema of the papilla is partly due to *stasis in loco*, and partly to extension from the optic-nerve trunk. And thus we should be approaching Parinaud's point of view.

Case 3.—Joseph D., aged thirty-seven, July 13, 1885; has been ill for three weeks with pressure over stomach, eructation, headache, vertigo, chills and fever, and constipation.

Right papilla just visible amidst the conflux of vessels; very red, swollen margins, numerous hemorrhages, veins tortuous, arteries difficult to catch.

Left eye the same, though less marked.

Paralysis of right facial and left abducens followed; in August great mental confusion.

September.—Ophthalmic picture as before; papillæ dirty gray, prominent, vessels difficult to discern; circular hemorrhage around papilla, and probably arising from the confluence of several small ones. Beyond, the vessels again come into view, the

tortuous veins still accompanied with round hemorrhages hanging about like berries. Numerous small hemorrhages outward from papilla ; Jaeger, 9.

September 30th.—Retinal arteries thin.

October 19th.—R. E., S $\frac{1}{\infty}$, with apparent contraction of field. L. E., fingers at 1 *M*, field normal, papillæ more distinct.

December.—Total amaurosis ; deep psychical affection ; ophthalmoscopic examination impossible.

February 7, 1886.—Death.

Large tumor of right cerebral hemisphere, which has strangely altered the contiguous districts ; inner surface of dura, upper surface of arachnoid, at convexity and base of brain, very dry ; convolutions flattened ; chiasma pressed close to the orbital lobes ; arachnoid thickened, infundibulum prominent, optic-nerve riband-shaped, but no alterations in the section ; left lateral ventricle dilated, right contracted by contact of the walls and pressure of the tumor.

One eye was hardened in Müller's solution, the other in osmic acid.

Cross-section of the latter measured $2\frac{3}{4}$ to $3\frac{1}{4}$ *mm* in diameter, at 6 *mm* from the lamina cribrosa ; 3 to $2\frac{3}{4}$ *mm* at 15 *mm*, and $3\frac{1}{4}$ to 3 *mm* at 25 *mm* from the same.

Longitudinal sections show a characteristic choked disc, excepting the ridge above the choroidal foramen. The nerve-fibre layer at the foramen is 0.56 *mm* thick ; 0.48 *mm* thick, 0.5 *mm* from the foramen ; and 0.24, 1 *mm* away.

Low powers show that the bundles of nerve fibres bend in apparently normal fashion above the lamina into the retina. With higher powers we see that they are interspersed with a tangled mass of hypertrophied connective tissue to which the hypertrophic stroma unites ; papilla filled with golden yellow and brown pigment ; numerous cross-sections of vessels with thickened brilliant walls which do not imbibe carmine well. Some of the vessels are collapsed, others partly contracted and partly with proliferated endothelium ; slight increase of connective-tissue cells in the papilla.

There are numerous foci of hypertrophic nerve-fibres in the layer of nerve fibres ; the ganglionic layer is partly destroyed, and the granular layer, though normal for some distance from the papilla, soon begins to hold the same pigment deposits, then fresh hemorrhages, and a few large granulated globules.

The lamina cribrosa contains a considerable proliferation of connective-tissue and moderate increase of cells, so that the normal longitudinal striated appearance is lost. Here and there in the meshes glittering sections as if of sclerosed nerve fibres, but usually it is difficult to tell what the fissures contain.

Beneath the lamina we find near the medullated nerve fibres a finely meshed network with cells. This mesh-work contains in the axial portion of the nerve, and most pronounced near the lamina cribrosa, many fine and dark-tinted myeline granules, and a few granular cells, whilst the marginal portions are free of both.

About 4 *mm* behind the lamina we suddenly meet with a multitude of granular cells corresponding to the more axial bundles of nerves; in the network we observe at the same time a slight tendency to longitudinal fibres, but without any osmium tint, whilst further behind, these fibres are more and more distinct. This appearance depends on the presence of fine glittering fibre-fragments, which, though bent and twisted preserve a general longitudinal direction, and are covered with a fine dust consisting of drops of medulla.

These elements near the foramen are mingled with pieces of medullated and partly varicose nerve fibres.

The cells inside the nerve-fibre bundles contain large and swollen cell bodies, with homogeneous protoplasm, large distinct nuclei, and nuclear particles.

The optic nerve within the canal shows peculiarities: macroscopically four small, dark, quadrilateral spots are seen; microscopically, these prove to be four bundles of nerve fibres set off against the rest by their opacity, which does not depend so much on a stronger coloring with osmium, as that the fundamental portion seemed impregnated a dull yellow with some opaque liquid. This alteration extended through several cross-sections, and then gave wayto the usual condition.

The connective tissue in the stroma of the optic nerve is sclerosed, particularly also in the walls of the vessels, from the smallest up to the central vessels with their surrounding connective-tissue sheaths. Connective-tissue cells are rare in the stroma, but near the lamina are numerous vascular orifices full of blood. The central vessels also gape, and contain blood; they are surrounded in the papilla with a fibrous mesh-work containing numerous cells.

Dural sheath near the globe folded; intervaginal space dilated,

filled with celloidin and finely granular exudate, which preferably adheres to the intervaginal beams. It is free of cells, but contains clumps of fine black myeline particles (which are also found in the cells appertaining to the intervaginal space) as well as cells like those deposited on the intervaginal beams. Myeline drops in the tissue as well as on the outer surface of the pial sheath, which is otherwise normal. The intervaginal space contracts rapidly toward the brain, and then contains numerous cells.

The other optic nerve was, intentionally, first hardened in Müller's solution, and then tinted with Weigert's hæmatoxylin, which, unfortunately, did not act as well as osmic acid, because it did not tint the granular cells. The free myeline, as well as that attached to the medullated fibres, was sufficiently tinted.

Osmic tinting has, however, the disadvantage that the requisite minute division of the nerve is but little fitted to preserve an œdema or intervaginal hydrops. I therefore generally place the eye and nerve in Müller's solution, cut it up in osmic acid, and then harden it in alcohol with good results.

The three cases represent three stages of the regressive period of choked disc; in the first we see varicose degeneration and atrophy of the nerve fibres, the latter chiefly affecting two or three layers of the marginal bundles, so that they look like black medullary fragments. Toward the axis of the nerve we discover free myeline scattered amongst the varicose fibres.

Varicosity of the medullated nerve fibres can be produced either during life as the predecessor of atrophy, or as a post-mortem condition. When we submit fresh bits of nerve to the action of serum or salt and water, the myeline sheaths split asunder, and the medulla spouts forth from the ends of the sections in all sorts of tangled shapes (Ranvier's "swelling of the myeline").

As we cannot exclude in our case the post-mortem action of the œdema liquid upon the nerve fibres, we ask whether this is a vital or a post-mortem appearance.

In order to decide this question we had to discover whether the prolonged action of serum or salt water upon nerve fibres would produce not only varicosity but an extrusion of myeline. According to Ranvier the latter

cannot be produced in common nerves (ischiatic). In order to set the myeline free, we need the action of chemical reagents, *e. g.*, concentrated soda lye, by which Schwann's sheaths are destroyed. But as the optic nerve has no such sheaths, this observation had to be tested by a special experiment: a fresh optic nerve from a calf, left for a day in a ¾ % of salt and water, showed, after osmium hardening, the varicose nerve fibres, but no free myeline.

It would therefore seem as if we had the right to assume that the free myeline in Case 1 was liberated during life by the atrophy of the medullary sheaths, and since it is a fact that the latter show incipient atrophy by medulla collecting at various spots in the form of varicosities, we can take it for granted that in our case also, the varicosity of the nerve fibres and atrophy are to be regarded as the sequences of two pathological processes.

The alteration in the optic-nerve trunk presents itself in three forms, depending on whether we investigate the more axial, or the marginal, or the intermediate cross-section of the nerve.

The axial portions correspond with those in Case 1, showing cross-sections of varicose nerve fibres and free myeline. The intermediate zone corresponds to the marginal zone of the previous case, in so far as the bundles contain thicker deposits of myeline, as well as spots where the nerve fibres have been entirely destroyed. Finally, the marginal zone is characterized by the total absence of nerve fibres, the bundles consisting simply of a stroma, with fine reticulations and many granulations which the osmium has failed to color. This zone gradually disappears toward the brain, assuming the character of the intermediate zone.

The pith of the pathological alterations in Case 2 evidently lies in the total destruction of the nerve fibres in the marginal zone. We shall scarcely go astray in assuming that the degenerated products of the nerve medulla were swept away by the strong lymph stream of the œdematous optic nerve. Since this stream passes out of the nerve and into the intervaginal space, this view obtains a certain support by the frequent discovery of free and cellular myeline in

this space. The total absence of granular cells in the nerve trunk may be explained by the rapidity with which the evacuation was accomplished.

If the nerve-fibre bundles in the first two cases toward the axis were but little altered, in the third we see the impending danger; the diffuse atrophy of a few fibres has increased to the total destruction of the whole, and amaurosis has supervened. It is of the most absorbing interest to note that, despite the extensive atrophy, it started in this case also from both the epibulbar and marginal portions of the optic nerve. For, whilst these portions are without myeline and granular globes, and there is not the slightest trace of nerve fibres, yet the appearance of the axial medulla (free or enclosed in cells) together with the bits of nerve fibres increasing in number toward the brain, shows that, although conduction is cut off, the destructive process has not entirely annihilated the nervous elements.

The most remarkable point of difference lies in the granular cells within the optic nerve. We can imagine that the escape of medullary fragments is sufficiently slow, in comparison with that at the margin, to give the cells that are present time to incorporate the myeline particles.

The degenerative process in the optic nerve may, on the whole, be regarded as simple atrophy. The accumulation of cells in the pial sheath in Case 2, and their continuation for a short distance in the neighboring stroma, together with the increased neuroglial cells in the degenerated nerve fibre bundles, are a secondary symptom absent in the earlier stages. They are, however, too trifling to be regarded as the cause of the atrophy, or else they simply appertain to degeneration of the nerve fibres, in the same way as the prolifieration of cells in the interior of the nerve-fibre bundles. To secondary processes, though in a higher degree, do we ascribe the sclerosis of the connective tissue of the optic nerve in Case 3.

It is still more difficult to decide *where the degeneration originates.*

Two views are possible; the atrophy is an ascending atrophy; it starts at the level of the scleral foramen.

One of the most characteristic symptoms of choked disc is the constriction of the nerve as it passes through the sclera, owing to which the marginal bundles of non-medullated nerve fibres bulge out over the choroidal foramen. It would not be too bold to assert that this constriction produces in the marginal bundles a pressure-atrophy, which is not at first visible ophthalmoscopically, and may even escape histological diagnosis, because it is very difficult to recognize incipient degeneration in naked nerve fibres. Such an interruption of conduction would, as in neurotomy, result in degeneration of the corresponding nerve bundles in the main trunk; in other words it would reveal itself as a marginal atrophy which we should be obliged to *regard as systemic.*

On the other side, we meet with many doubts.

Although investigations show that the degeneration is at its maximum in the epibulbar portion of the optic nerve, and that it decreases in extent and intensity toward the brain, and although it seems impossible to conclude from this fact that the process is not actually ascending, nevertheless the theory of ascending systemic atrophy poorly coincides with the surprising fact, that careful comparison of a series of sections proves that the maximum of degeneration is not situated close to the lamina cribrosa, but a trifle behind. If this distance were not altogether too minute, so that errors could not be excluded, this fact alone would be sufficient to preclude the possibility of degeneration ascending from the scleral ring.

Another objection is that the degeneration from the globe to the chiasma is always marginal. The anatomical examination of Case 2 showed that near the globe the temporal marginal bundles, consequently a portion of the fibres which pass to the papilla and in the orbit are near the axial portion of the nerve trunk, were all destroyed. If this were a systemic atrophy, it ought to have revealed itself in a corresponding alteration in the location of the atrophic bundles, because the pathological process could be followed to the chiasma. But this was not the case; the axial portions of the section were healthier than the margi-

nal, although the latter was not by any means so much degenerated near the foramen as near the globe.

In this latter circumstance we might find still further reason to doubt a systemic atrophy, were we not led to consider another point of a different nature, and not in the same direction.

The conditions in choked disc are quite different from those in central scotoma, where the anatomical examination of the optic-nerve trunk gives a key to the course of the macular fibres. In these cases we have partial disease of the nerve confined through the entire length of the fibres.

The supposed compression of the non-medullated fibres, at the level of the scleral ring, produces slow interruption of conduction, fibre by fibre, and at the same pace; the secondary degenerations in the medullated fibres extend toward the chiasma; this process cannot therefore be considered as excluded, and it is this symptom that chiefly hinders the diagnosis of systemic atrophy.

We shall later return to clinical observations of ascending atrophy, and I will only say that I doubted its presence in Case 2, although the degeneration extended as far as the chiasma, because the papilla was not discolored, but simply swollen when I examined it eight days before death. If I have above acknowledged that it is not necessary to see the destruction of the non-medullated fibres at once, yet we must consider whether it is possible to harmonize so complete an atrophy of the marginal bundles, and total resorption of the medullary fragments, with the fact that the ophthalmoscope showed no alterations at the papilla, the starting-point of the process, eight days before the patient died.

We are therefore led to a second theory in regard to the atrophic process.

Since the degeneration of the nerve fibres gradually increases from the axis towards the margin, it is plain that a morbid process affecting the entire section, in so far as it exercised a concentrated action only toward the margin, would explain the form that the degeneration takes, especially if we assume that the morbid process exercises its

maximum effect near the globe. If we are not to indulge in any thing but blind hypotheses, we can fall back on nothing so correctly grounded in an anatomical point of view as œdema of the optic nerve.

It is indeed true that the existence of œdema has been opposed by some ophthalmologists, *e. g.*, Deutschmann lately[1] declaring that he has seen the so-called œdema of the optic nerve in all sorts of normal and diseased eyes that had been imbedded in celloidin, and that my œdema liquid, in the lymph spaces, is nothing but the imbedding material.

I express no opinion regarding what Deutschmann has seen in his preparations, simply because I have not examined them myself. But I will remark that it is so easy to distinguish celloidin from a finely granular exudation with characteristic myeline figures, and so easy to remove celloidin from the section with ether, that I will not trouble myself to dispute what Deutschmann says. I will merely suggest, however, that he has overlooked Poncet's reports and description of optic-nerve œdema, seen long before the discovery of celloidin imbedding.

Here again Deutschmann seems to stand within the compulsion of his old habit—denying œdema because he has never been fortunate enough to see it for himself, after choked disc. And yet he might well have confessed that four cases of this disease as cited in his monograph are but little suited to throw light on the pathogeny of this affection. We all know that in order to study a case of chronic disease like choked disc, fresh cases must be used—cases caught in their very development; nevertheless, Deutschmann rests his theory on cases no one knows how old, which were not carefully examined with the ophthalmoscope, nor anatomically examined with care, at least so far as the optic nerve was concerned.

I shall continue to believe in œdema, though in the finer details doubts will still exist. The cause of the atrophy seems a matter of indifference, so far as general appearances are concerned, but the marginal and epibulbar localization still demand discussion.

[1] "Ueber Neuritis Optica," Jena, 1887, p. 16.

We find sub-pial œdema in choked disc, just as in Schwalbe's experiments beneath the pial sheath of the orbital portion of the nerve, and it has repeatedly seemed as if the œdema were more pronounced in the epibulbar portion of the nerve than further behind. Here, too, is a certain analogy with intervaginal hydrops which has its maximum at the bulbar end of the intervaginal space. At the same place we also find the most extensive escape of optic-nerve lymph through the pial sheath backward, whilst farther behind it is less noticeable. I believe now that these conditions depend on a certain stasis and consecutive accumulation of lymph, both at the cribrosa and pial sheath, and I am inclined to connect the localization of the optic atrophy with the localization of the stasis of the lymph.

If we look at it from this point of view, the disease is not a systemic atrophy, ascending from the papilla, but a diffuse degeneration within the entire course of the optic nerve; if it deceives us into the idea that it really ascends, it is solely because it has its maximum near the lamina cribrosa.

The idea of an ascending atrophy rests, moreover, and not for the least part, upon clinical observation. It was early known that choked disc did not necessarily lead to loss of sight, but that vision first began to suffer when regressive alternations were seen in the papilla, and coincided in point of time with them. The latter view is correct so far as we understand by regressive alterations, the decreased congestion, but not the atrophic discoloration, which ensues upon the disturbance of vision, so far, at least, as I have been able to discover by following out several cases with the ophthalmoscope.

The sequence in time is not difficult to explain. The atrophic process simultaneously excites a disturbance of vision, and decreased tension within the pial sheath, the vessels are relieved of their abnormal pressure, and the stasis decreases. Soon we see discoloration of the papilla, from which we have been accustomed to conclude that the non-medullated nerve fibres have been destroyed. The rapidity with which this ensues is not remarkable, since the

primary atrophy existing near at hand, it must extend rapidly into the papilla. On the other hand, it is plain that if the case is not followed with the ophthalmoscope we shall be easily led to think that the disturbance of vision is dependent upon the discoloration of the papilla.

It is hardly necessary to decide at this time in favor of either of the views advanced in this paper; suitable material is always at hand, investigations will soon begin, and perhaps other important support for the interpretation of weighty facts be obtained. In the meanwhile, I am inclined to support the theory of a primary diffuse atrophy of the optic-nerve trunk, produced by œdema.

In such a light the choked disc loses much of its importance as a morbid process. If it had long been granted that primarily it does not greatly threaten the sight, we now see that secondary optic atrophy may be developed independently. Thus the choked disc sinks to a symptom important enough in a diagnostic point of view, but of only secondary value, so far as the nature of optic-nerve disease is concerned. It becomes a sort of ophthalmoscopic signal, announcing that in the nerve and behind the eye a pathological process is playing a part that will in all probability sooner or later endanger the sight. This signal need not be necessarily present; the stasis at the papilla may be absent or slightly suggested, if the œdema has not advanced to the anterior portion of the nerve trunk, nor extensively compressed the central vessels. But for all that, retrobulbar atrophy may be produced, gradually extend to the papilla, and so give rise to the picture of simple optic atrophy.

This way of looking at it will explain those rare cases of simple discoloration (descending atrophy) of the papilla in brain tumors or chronic meningitis.

TWO CASES OF COLOBOMA OF THE MACULA LUTEA.

By Dr. P. SILEX, Assistant at the Ophthalmological Clinic of the University of Berlin.

Translated by Dr. H. A. B. McCauley, of New York.

(*With plate v. of vol. xviii., Germ. ed.*)

IT is a well-known fact that the macula lutea has not been definitely proven to be a part of the fœtal ocular cleft. Brücke,[1] Huschke,[2] von Ammon,[3] and Manz,[4] among others, have maintained this to be the case unreservedly, basing their opinion upon theoretical grounds. Köllicker,[5] while of the same opinion, adds that if at the beginning the peduncle of the ocular vesicle were the end of the ocular cleft, the optic nerve could not be its end later on. Up to the present time, however, such a dislocation of the optic nerve has not been proven. Schwalbe[6] also says that nothing positive is as yet known about the development of the fovea centralis, and that if we regard it as the remains of the fœtal ocular cleft, we must presuppose a considerable revolution of the bulbus upon its axis. Von Vossius, however, partly explains this by his demonstration of the entrance of the vessels of the optic nerve into the lower

[1] "Anatomische Beschreibung des menschlich. Auges," Berlin, 1847.
[2] "Eingeweidelehre," S. 728.
[3] *Graefe-Sämisch's Handbuch der gesammt. Augenheilk.*, 1876, Bd. ii., S. 47 u. f.
[4] *Illustrirte med. Zeitung*, 1852, Bd. i.
[5] "Entwicklungsgeschichte," 1876, S. 684.
[6] "Lehrb. der Sinnesorgane," 1885, S. 114.

lateral quadrant. DeWecker[1] agrees with Sattler in thinking that the fœtal cleft is situated low down, and that when there is incomplete closure of it, this persists as coloboma of the lower border of the pupil. Although 21 cases of such coloboma exist—von Ammon[2] (pathol. anatom. description), Streatfield[3] (2 cases), Reich,[4] Talko,[5] von Wecker[6] (2 cases), Schweigger,[7] Schnabel[8] (5 cases), Hirschberg,[9] Montmeja,[10] Schmidt-Rimpler,[11] Fuchs[12] (2 cases), van Duyse,[13] Remak—[14] Wiethe,[15] an agreement as to the *raison d'être* of the condition has not yet been possible; and I therefore venture to hope that the two following cases, recently observed by me at the university clinic, may help to clear this mooted question:

Case 1.—Franciska F., sixteen years, family healthy. Neither she nor any of her relations have ever had a disease of the eye. Since earliest youth, has seen badly left, with an external squint, which was operated with complete success.

Condition after the operation: A healthy girl, free from constitutional taint; position of eyes good; free movement. Right E, S = $\frac{6}{6}$.

Left, S = finger at 1 metre.

F up = 35°, up and out = 60°, out = 75°, out and down = 75°, down = 60°, down and in = 30°, in = 30°, in and up = 40°. Recognizes colors; relative scotoma for white and colors in the centre. Boundaries cannot be determined exactly. Refractive media clear. Papilla is normal (see Plate v.), sharply defined, round, grayish-red, with slight temporal reflex from the vessels, and small medial scleral stripe. In the region of the

[1] *Graefe-Sämisch's Handb.*, Bd. iv., p. 594.
[2] *Illustrirte med. Zeitung*, 1852, p. 319.
[3] *Ophthalm. Hosp. Rep.*, 1886, vol. v., p. 79.
[4] *Zehender's klin. Monatsbl.*, 1870.
[5] *Ibid.*, page 165.
[6] "Traité des maladies du fond de l'œil, and *Gräfe-Sämisch's Handb. der gesammt. Augenheilk.*, vol. iv., p. 595.
[7] "Handb. der Augenheilk.," 1st edition, p. 36.
[8] *Wiener med. Wochenschr.*, 1876, No. 34, and *Wiener med. Blätter*, 1884, No. 6 u. f.
[9] *v. Græfe Archiv. f. Ophthalm.*, vol. xxi., 1, p. 177.
[10] *Nagel's Jahrb.*, 1872, p. 211.
[11] *v. Gräfe Archiv.*, 1880, p. 230.
[12] *Ibid.*, 1882.
[13] *Annales de la Société méd. de Gand*, 1884, p. 12.
[14] *Centralbl. f. prakt. Augenheilk.*
[15] Knapp-Schweigger's Archiv, vol. xiv., p. 11

macula lutea, beginning about 1 PD from the papilla, a defect is seen which is about 2.5 PD in width and height, and appears as though gouged out with a punch. The ground tone of the whole part is brilliant white, with a slight yellowish tinge by lamplight. Irregular pigment patches are distributed here and there, and produce a spotted appearance like a tiger's skin. Surrounding the defect, a sharply-defined pigmented border appears, which forms a continuous line in its lower two-thirds, but is interrupted in places above, and running around this border is seen a dull, grayish-blue zone about $\frac{1}{2}$ *cm* in breadth in the upright image, of homogeneous structure and symmetrical extension. Refraction at the floor of the defect is increased about 2D. The upper and lower macular vessels and a branch of the art. temp. inferior cease abruptly at the border of the defect, while a branch of the superior temporal is interrupted at the boundary line, but begins again just at the pigmented border. At upper and middle and lower and central parts of the defects are two choroidal vessels converging towards the temporal region. The middle section of the first of these is covered over by dull gray atrophic tissue. External and inferior to the coloboma, and separated from it by a narrow strip of normal tissue, are noticed two bluish-gray masses (the larger of which is about the size of the papilla), lying close together upon the same level, and dotted over by black pigmented spots. A retinal vessel of large calibre passes in front of the focus.

About a week later the following case presented itself:

Case 2.—Helene S., nine years. A healthy girl of fair family history with periodical divergent strabismus of the left eye. Externally the eyes are healthy. Right: + 18 S = $\frac{6}{6}$, = 2 DH; left: S = $\frac{1}{36}$ = 4 DH. F free. White and all other colors seem duller in the centre. Ophthalmoscope, left: refractive media clear. Papilla seems hyperæmic, oval lengthwise, not sharply defined, and is surrounded by a yellowish-white line about $\frac{1}{6}$ PD wide, which loses itself in the neighboring normal tissue. A similar marking is noticed above and external to the papilla. The vessels are neither convoluted nor distended and arise from the centre of the latter. Occupying the region of the macula lutea and about 1 PD from the papilla, a peculiar round patch shows itself, about 2$\frac{1}{2}$ PD high, 3 PD wide. Its sharply defined outline is surrounded by a more or less broad pigmented border for the greater part of its extent, adjacent to which several quite narrow grayish-blue zones appear. There is a difference of refraction

of 1 D (4 DH = 3 DH) between the edge and the fundus of the coloboma. The ground tone of the defect is whitish with a dull-gray tinge. There are also aggregations of black pigment strewn over the surface, forming all sorts of figures. At the medial border, two small light places are seen, similar to the appearance noticed between the large vessels of the choroid in eyes poor in pigment. A similar marking tinged with yellow, which is bounded internally by a narrow grayish-black pigmented line, is remarkable at the lower outer border. The middle of the whole is occupied by *a grayish-blue mass with a black spot of pigment in the centre.* A single retinal vessel only, testifies to the proximity of retinal tissue. This is a branch of the superior temporal artery which encroaching upon the excavated territory at its upper outer border between its middle and outer third, passes about 1 PD farther down, and after giving off a twig which continues downward, terminates abruptly at its outer border. The small branch mentioned leaves the implicated part and undergoes further dichotomous division.

Comparison of these two cases with those described earlier shows certain similarities and certain dissimilarities. In all, the region of the macula lutea is implicated; they exceed this in size, however, and in most cases show a longer horizontal than a vertical diameter, differing in this respect from the fœtal cleft; furthermore they are sharply defined and surrounded by a more or less completely developed border of pigment. In the majority of the cases a small light zone is found surrounding this pigmented border, which Schnabel regards as characteristic of congenital coloboma. This was also present in my cases. In most cases, my own not excepted, the sunken surface of the coloboma has a whitish coloration sprinkled over with coal-black pigmentary patches, and showing retinal and choroidal vessels. The same results were found with but slight variations in all of the cases, excepting those of Schmidt-Rimpler, Reich, van Duyse, and de Wecker (first case), which showed a bright white scleral-reflex without pigmentation. These latter differed functionally from the above cases in that the visual power was relatively good (Schmidt-Rimpler and Reich almost complete sharpness of vision and de Wecker = $\frac{1}{2}$), while the sight of the first-mentioned group was nota-

bly diminished, with absolute scotoma in some, in others relative, and in still others no scotoma at all.

The results found in our cases differed from all the others (excepting Talko's), in that small isolated specks of pigment were noticed in the retina between the papilla and the coloboma; witness for instance the choroidal focus external to the coloboma in Case 1, and in Case 2 the centrally located mass, which the ophthalmoscope proved to be the product of a choroiditis. It would not be permissible to regard this first focus as a secondary partial coloboma on account of its position and the absence of retinal alterations and staphylomatous protrusion. According to this, then, we should regard these spots as the result of a disease of the choroid; and, furthermore, since similar spots were also found at the site of the coloboma, these must likewise be due to the same cause. More than this, the large grayish-blue focus with the black pigmented centre, which was situated in the middle of the defect in Case 2, is often seen in bad cases of myopia accompanied by choroiditis of the macula lutea.

We have, therefore, two patients with two diseases, which are so often described as congenital macular coloboma, depending upon the fœtal cleft for its causation, but which upon closer consideration appear to be the results of a choroiditis. For this reason, and also on account of the great similarity of our results with the great majority of those found by others, it seems quite permissible for us to think that most of these cases, if not all of them, were brought about in the same way. Moreover, this view has already found favor with Schweigger and others, and would find a ready application in cases where there was a great deal of pigmentation, together with demonstrable choroidal vessels and atrophy of the retina. We think the choroid would be implicated during intra-uterine life. Schanbel does not see why an intra-uterine choroiditis should produce a different result from that of extra-uterine life, and this is true in most cases, but I venture to think that the appearances do not differ so very much from those of certain acquired forms in the adult; and secondly, that the variation might be

explained by the fact that there is a difference in the amount of pigment contained in the fœtal and adult eyes. It is well known that the deposition of pigment does not take place until the last months, after the pigmentary epithelial layer has fully developed, and if a choroiditis should run its course before the deposit of pigment in the stroma of the choroidea, the ophthalmoscope would readily show us other appearances than those resulting from the process later in life. *We think the results found are caused by a chorio-retinitis which leads to partial or complete atrophy of the membranes and hypertrophy of the pigment, with secondary softening and staphyloma of the sclerotic.*

As far as the colobomas mentioned by Reich, etc., are concerned, whether they were due to a choroiditis, notwithstanding the absence of the signs of such a complication, or were, as Schmidt-Rimpler thinks, anomalous formations, having no connection with the fœtal ocular cleft, or whether they were true colobomas, due to defective closure of the cleft, remains an open question for the present, and will remain so until we know more about embryology.

A CASE OF RESTORATION OF THE INTEGUMENT OF THE UPPER LID BY TRANSPLANTING A FLAP WITHOUT A PEDICLE.

By JOHN E. WEEKS, M.D., New York.

(*With two drawings.*)

Sarah C., age twenty-two years, came under my observation at the Emigrant Hospital in July, 1885. About twelve years previously she had received a severe burn of the face, which resulted in destruction of the skin over the left upper lid, and partial destruction of the skin of the adjacent parts of the forehead, temple, cheek, and nose, which healed by the formation of cicatricial tissue over the affected parts. The conjunctiva and cornea escaped injury. The lower lid was slightly everted by traction of the cicatricial tissue, and the upper lid was wholly everted, its margin being adherent to the brow; the left brow was higher than its fellow. No pockets of healthy skin were present between lid and brow. By long exposure the conjunctiva of the upper lid had become partly cutaneous, hypertrophied, and uneven. When the cornea was turned downwards the upper conjunctival sac was entirely obliterated, when upwards to the greatest extent possible its upper half or two thirds were covered. Exposure of the lower third of the cornea had resulted in superficial ulceration and a cutaneous, scaly condition of the corneal surface. The upper part of the cornea was clear. The interior of the eye was normal. $V = \frac{20}{40}$. The intermarginal space of the upper lid had not suffered and the ciliæ were almost entirely preserved; this was also the case with the lower lid. Right eye and lids normal.

Operation: The parts were first thoroughly washed with soap and water and afterward with a bichloride solution 1–2,000. The lid was separated from the brow, care being taken to include the orbicularis muscle with the lid. The incision was continued until

the fascia orbitalis could be seen. The upper lid was then made to overlap the lower about one half of an inch and it was fastened in this position by four sutures, the sutures entering the lid at the entrance of the ciliæ and coming out a line above the inner angle of the intermarginal space on the conjunctival surface, then passing through the skin of the cheek, and when tied making the lid immovable. The space thus obtained measured about 1¾ by 1½ inches in the longest diameters. The surface of the skin of the left arm over the biceps, a little to the inner side, was then prepared by washing with soap and water, alcohol, and lastly bichloride 1–2,000, and a portion of skin was removed from an area measuring 2⅝ by 2¼ inches. No subcutaneous tissue was removed nor was the flap fenestrated. The fingers were used to support the flap as much as possible, so as not to compress by forceps, and as the dissection progressed the flap was kept warm by covering with borated cotton which had been dipped in hot water. The removal of the flap consumed about thirty minutes. It did not change much in color during the time but shrunk considerably as soon as separated from the subcutaneous tissue. At this time oozing of blood from the surface for its reception had ceased and the surface was covered with a glistening layer of plastic lymph. It had been protected during the greater part of the time by a layer of borated cotton which had been dipped in a hot, weak solution of bichloride. The removed flap was placed on this surface, which, by very little trimming, it fitted nicely. No sutures were employed. On account of the presence of the plastic lymphatic exudation adhesion of the two surfaces was appreciable at once. The bandage applied was composed first of a layer of borated cotton squeezed out of a weak hot solution of bichloride, a second layer moistened with the bichloride solution, then dry cotton, a piece of rubber tissue, and a muslin roller.

The patient had no pain after the operation, and no discharge appeared. Five days after the operation the bandage was removed and the flap was found to be perfectly united in all its parts. A drop of pus appeared at the point of entrance of the inner suture through the lid. None anywhere else. The flap looked a little pale, and the epithelium was scaling off in places, leaving a reddish floor. The bandage was reapplied. The sutures confining the lid to the cheek were cut on the ninth day and the eye examined. The cornea was found to be clearer than before the operation. At first the upper lid could be raised but very little,

but the power of the levator palpebræ superioris gradually overcame the stiffness of the flap, until at the end of eight months the lid could be raised so that its margin was just at the upper border of the pupil (see Fig. 1). The lids could be well brought together over the cornea (see Fig. 2), the defect in the lower lid being perfectly filled by the upper.

FIG. 1.

FIG. 2.

About one year after the operation, when the eye was last seen, the conjunctiva of the upper lid had become quite smooth, but was not entirely natural. The cornea was clear, except a slight opacity in its lower third. $V = \frac{20}{30}$. The flap attained its permanent size in three months after the operation, at which time it measured one inch in transverse diameter and $\frac{15}{16}$ of an inch in its perpendicular diameter. Six months afterward the flap measured exactly this same size. It was paler and a little thicker than the integument of the left lid, but was thrown into folds when the lid was raised. The contrast between the flap and the surrounding cicatricial tissue was quite marked, but the difference was rendered inappreciable by the use of a simple cosmetic.

The wound on the arm was partially closed by sliding flaps, sutures and strips of adhesive plaster being employed to hold the parts in place. The healing, which was rapid, was in part by granulation tissue, and resulted in a flat, smooth cicatrix.

REMARKS.—The size of the flap employed and of tissue secured after shrinkage had ceased, is larger in this than in any other case that I have observed or can find reported. Wolfe reports a case (*Pract.*, Lond., '83, p. 331) in which the flap employed was one by two inches (the longest

diameters). In the case reported above the shrinkage in the size of the flap was to about one fifth of the area of the surface marked out on the arm. This is about the degree observed in the two other cases that I have seen where this method was employed. In some cases operated on by Wolfe failure occurred, attributable, he thinks, to the presence of subcutaneous tissue on the flap. He advises the careful removal of subcutaneous tissue before the flap is finally put in place, and thinks that sutures are not required. In his operations the margins of the lids are stitched together, and are not cut apart until some two weeks after the operation. I do not think that simple union of the lids will give a denuded surface sufficiently large to provide for subsequent shrinkage of the flap, but think that the lids must be made to overlap each other in operations where the part to be restored is large.

The following conclusions, which correspond closely to those of Wolfe, are probably warrantable by what has preceded and by a perusal of the reported cases:

1st. The transplantation of a flap without a pedicle is not so likely to succeed as is transplantation of a flap with a pedicle, and should only be employed when suitable tissue for a flap with a pedicle cannot be utilized.

2d. Provision should be made for shrinkage to about one fifth of the area of the flap *marked out* for removal.

3d. The flap should be carefully dissected from the subcutaneous tissue, nothing below the rete mucosum or papillary layer being removed; it should be kept warm during the process.

4th. All bleeding should be stopped before the transfer is made.

5th. No sutures are required or desirable to secure the flap.

6th. The bandage should be permitted to remain in situ from five to seven days before changing.

7th. Thorough asepsis should be observed during the whole procedure.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY DURING THE FIRST AND SECOND QUARTERS OF THE YEAR 1888, CONCLUDED.

By H. MAGNUS, Breslau; C. HORSTMANN, Berlin; and A. NIEDEN, Bochum.

WITH THE CO-OPERATION OF

S. M. Burnett, Washington; Dantone, Rome; Hirschmann, Charkow; E. Marckwort, Antwerp; P. v. Mittelstadt, Metz; Werner, Dublin; C. H. A. Westhoff, Amsterdam; Schjötz and Ole Bull, Christiania, etc.

Translated by F. E. D'Oench, M.D., New York.

Sections XII.–XXI. Reviewed by Dr. A. NIEDEN.

XII.—IRIS.

190. Carpenter, Geo. Congenital absence of iris. Case shown at the meeting of the Hunterian Soc., London, April 25th. *Brit. Med. Jour.*, March, 1888, p. 1063.

191. Despagnet. De l'iritis blennorrhagique. Congr. d'ophth. de Paris. *Rec. d'ophth.*, May, 1888, p. 261.

192. Grossmann, Carl. Cysticercus or iris cyst. *Ophth. Rev.*, March, 1888, p. 129.

193. Hirschberg, J. Irido-cyclitis leprodes. *Centralbl. f. Augenhk.*

194. Przibylsky. J. Some cases of villosity at the pupillary margin of the iris. *Wjestnik ophth.*, March–April, 1888.

Carpenter's (190) case of congenital absence of the iris was that of a child three years old. The fundus was normal. There was nystagmus, and the child suffered with congenital talipes

equinovarus. The mother had nystagmus, convergent strabismus, irideremia, and posterior polar cataract. The fundus was also normal. WERNER.

DESPAGNET (191) reports interesting clinical cases of blennorrhoic iritis. Despagnet saw the iritis develop eight days after the beginning of the "écoulement," and not until five days later an arthritic inflammation of the wrist. He observed in one patient in the course of three years three attacks of blennorrhoic iritis, a discharge in each case preceding it.

HIRSCHBERG (193) saw marked irido-cyclitis in both eyes of a young American, aged twenty-one, suffering with lepra nodosa, presenting, however, the peculiarity of the spontaneous disappearance of the nodules of the iris, only to reappear.

GROSSMANN (192) saw acute iritis of the right eye in a man aged thirty-three, after an acute attack of epilepsy, with which he had been afflicted for years. The attack was accompanied with a feeling of numbness of the left side of the body. The pupil was displaced and filled with a whitish mass, which, however, was said to have been noticed 1½ years previously. This neoplasm proved to be a cyst with nearly translucent contents, which projected into the anterior chamber, adhered to the lens, and covered the margin of the pupil. No spontaneous movements of the sac were noticed. The following day the cyst had burst, perhaps as a result of the action of the atropine, and in the course of a week it completely disappeared. Grossmann believes it was a cysticercus cyst, the spontaneous movements of the parasite being paralyzed by the atropine, and when the cyst burst in consequence of the dilatation of the pupil, the entozoön was absorbed. Grossmann, therefore, proposes to puncture the sac in similar cases. WERNER.

PRZIBYLSKY (194) describes four cases of villosity at the pupillary margin, and proposes for them the name "villositates congenitæ strati uvealis marginis pupillaris iridis," instead of the former names (papilloma iridis of Colsmann, ectropium uveæ congenitum of Hirschberg, Ancke, Reuss). HIRSCHMANN.

XIII.—CHOROID.

195. PANAS. Enucléation dans la panophthalmie. *Congr. d'ophth. de Paris*, 1888.

PANAS (195) reports the case of a patient in whom panophthalmitis developed three weeks after a cataract extraction. On

Feb. 17th, Panas performed enucleation, and the patient died on Feb. 25th. According to Panas, general infection had taken place before the enucleation, as shown by the purulent pleurisy, sympathetic inflammation of the other eye, etc., and confirmed by the autopsy. Panas thinks that the infection was made easier by an old interstitial nephritis. MARCKWORT.

XIV.—GLAUCOMA.

196. BUTTI. La sclerotomia posteriore nel glaucoma. Contributo allo studio della cura del glaucoma. *Boll. d'ocul.*, vol. x., 4.

197. MASSELON. De la sclérotomie équatoriale. *Congr. d'ophth. de Paris*, 1888.

198. NORRIS, W. F. Cases of acute primary glaucoma of primary hemorrhagic and of secondary glaucoma, with remarks and microphotographs. *Trans. Amer. Ophth. Soc.*, 1887.

199. WHERRY. Glaucoma caused by melanotic sarcoma of the eyeball. *Brit. Med. Jour.*, March 24, 1888, p. 648.

BUTTI (196) reports on another case of equatorial sclerotomy performed by Simi in a case of glaucoma. Two sclerotomies at the scleral ring having failed to benefit the patient, the scleral incision was made at a point between the insertions of the external and inferior recti muscles. Several drops of a serous liquid escaped, which the author thinks came from the suprachoroidal lymph-spaces. The tension diminished, the symptoms of irritation disappeared, and the patient regained enough sight to read. The author emphasizes the fact that the operator only desired to incise the sclera, not the choroid and vitreous, and had no intention of performing puncture of the vitreous. DANTONE.

MASSELON (197) has performed equatorial sclerotomy in various ways, and considers this the best method : a transverse puncture downward and outward, made with Graefe's knife a short space behind the ciliary body. He recommends this operation (1) in cases in which iridectomy has failed, and (2) in absolute glaucoma against the pain and progressive degeneration of the eye.

MARCKWORT.

In NORRIS' (198) first case of primary glaucoma the interesting feature was the absence of excavation, showing in the specimen, however, the softening atrophic changes in the head of the nerve which make it so ready to give way to intraocular pressure. In the case of hemorrhagic glaucoma the specimen showed hemor-

rhages in the sclera and in and around the canal of Schlemm. The retina was full of irregular hemorrhagic spots lying mostly in the outer parts, but very few affecting the fibre-layer. In the case of secondary glaucoma after peripheric linear operation for cataract there was a cystoid cicatrix and impalement of the iris at each end of the scar. BURNETT.

WHERRY (199) saw in a patient aged seventy an attack of glaucoma develop in one eye which had slowly been failing, but had never been painful. After enucleation the cause of the glaucoma was found in a melano-sarcoma of the choroid of about the size of a raisin. Its location is not specified. WERNER.

XV.—SYMPATHETIC OPHTHALMIA.

200. THOMPSON, J. L. Sympathetic ophthalmia. *Progress*, Jan., 1888.

THOMPSON (200), after giving more or less fully, the histories of several cases, concludes that sympathetic inflammation may follow ordinary inflammations of the eyeball, that abscision and evisceration are by no means reliable substitutes for enucleation in these cases, and that an eye wounded in the ciliary region if irritable and threatening the other should be removed, even though it has a moderate amount of vision left. BURNETT.

XVI.—LENS.

201. ARMAIGNAC. Nouvelle pince pour l'extraction d'un lambeau de capsule antérieure. *Rec. d'ophth.*, March, 1888, p. 176.

202. AYRES, S. C. Extraction of cataract without iridectomy. *Progress*, Jan., 1888.

203. BERRY, G. A. Note on an instance of marked heredity in a form of cataract developed in early life. *Oph. Rev.*, 1888, vol. vii.

204. BJERRUM, J. Hist statistik over inflammatoriske tilfalde efter kataraktextraktioner. *Nord. oph. Tidsskrift*, 1 and 2, Copenhagen, 1888.

205. BULL, C. S. Report of 36 cases of extraction of cataract without iridectomy. *Trans. Amer. Ophth. Soc.*, 1887.

206. BURNETT, S. M. Extraction of cataract without iridectomy. A clinical lecture. *Med. News*, Feb. 25, 1888.

207. CHIBRET. Infection secondaire de l'œil après l'opérations de la cataracte. *Rev. génér. d'ophth.*, 1888, No. 1.

208. COLLINS and TREACHER, E. Some of the complications after the extraction of cataract. *Ophth. Hosp. Rep.*, 1888, vol. xii., 1.

209. FREYER, B. E. Excessive hemorrhage of several hours' duration, beginning two hours and a half after extraction of senile cataract. *Amer. Four. Ophth.*, Feb., 1888.

210. HOTZ, F. C. Excessive hemorrhage after cataract extraction. *Amer. Four. Ophth.*, March, 1888.

211. MCKEOWN, W. A. One hundred consecutive cases of cataract, mature and immature, treated by intraocular injection. *Brit. Med. Four.*, 1888, p. 176.

212. MCKEOWN. Instrument pour les injections intraoculaires dans l'extraction de la cataracte. *Ann. d'ocul.*, vol. xcix., p. 144.

213. KNAPP, H. Report on a series of 1,000 successive cases of extraction of cataract with iridectomy. *Trans. Amer. Ophth. Soc.*, 1887.

214. MEYER, F. A case of lenticonus posterior. *Centralbl. f. Augenhk.*, vol. xii., p. 41.

215. LITTLE, DAVID. On the operative treatment of zonular cataract. *Brit. Med. Four.*, Jan. 28, 1888, p. 178.

216. PANAS. Opérations de cataracte par extraction avec lavage de la chambre antérieure. *Acad. de méd.*, Jan. 31, 1888, p. 34.

217. PEIGNON. De l'extraction de la capsule antérieure dans l'opération de la cataracte. *Thèse de Paris*, 1888.

218. RANDALL, B. A. The "Hohlschnitt" of v. Jaeger in the extraction of cataract. *Trans. Amer. Ophth. Soc.*, 1887.

219. SECONDI. Sulla maturazione arteficiale dell catterate. *Ann. di ottàlm.*, vol xvi., 5–6, p. 428.

220. WESTHOFF, C. H. A. Erythropsia in aphakia. Feestbundel Donders Jubiléum, Amsterdam, 1888, p. 256.

ARMAIGNAC (201) has constructed a new capsule-forceps, with which he claims the simultaneous seizing of the iris can be avoided, even when no iridectomy is made. Only the anterior part of the forceps can open, as the two branches are bent towards each other like bayonets, so that with the exception of the part lying near the point the two branches always remain 1½ *mm* apart.

MARCKWORT.

AYRES (202) thinks favorably of the extraction of cataract without iridectomy, though neither it nor any other method is adapted to all cases. No statistics are given. BURNETT.

BERRY (203) observed cataract in two girls, cousins, and was thereby induced to inquire into the history of the family, when he found that among 55 members belonging to 5 generations, 28 of whom were males and 27 females, 8 males and 5 females were affected with cataract. The hereditary disposition was therefore more marked among the female portion, and the transmission was also more evident with them than with the male portion. The cataract was not always congenital, and Berry is therefore inclined to consider it as a kind of premature senile cataract. WERNER.

BJERRUM (204) briefly describes the antiseptic methods and operative procedures at the clinic of Hansen Geat at Copenhagen: irrigation with a solution of corrosive sublimate (1:5,000), small flap-section, iridectomy, and antiseptic bandage. From Dec. 1, 1885, to March 1, 1888, 253 extractions were performed without a single case of panophthalmitis. In 7 cases there was severe inflammation, two of these being complicated cataracts. In all of them the inflammation developed at a late date (6 to 9 days).

SCHIÖTZ.

BULL (205) takes a conservative view of simple extraction, but is inclined to think it applicable to the generality of cases of senile cataract. No losses from the operation, and in none was $V < \frac{20}{200}$.

BURNETT.

BURNETT (206) gives a brief sketch of the evolution of the old flap method, of the Graefe method, and of the method of extraction without iridectomy as at present being done. His experience with the latter has been very satisfactory. He had done up to that time 24 such extractions.

CHIBRET (207) speaks of secondary infection in distinction from primary infection. In the former the bacilli have not entered through the wound, but at a distant part of the body, whence they have found their way to the operated part through the body. The healing of a reported case of extraction progressed favorably during the first week; then iritis developed and the pupil became obstructed by a profuse purulent exudation. According to Chibret these changes were attributable to an abscess of the foot.

MARCKWORT.

COLLINS (208) draws conclusions from the 50 cases of suppuration after extraction which he has collected, and finds that older

people are more inclined to suppuration. In 12 cases the cataract was complicated with an affection of the lachrymal sac, with conjunctivitis, and blepharitis. It is also probable that some of the uncomplicated cases suppurated on account of the poor nutrition of the cornea. In the majority of the cases the suppuration began between the first and third day, but in 8 not until after the eighth day ; some of the latter began with iritis. The suppuration was checked in 13 cases, but the eyeball shrank ; in the other 5 there was only occlusion of the pupil. He especially mentions 4 cases in which he attributes the inflammation of the cornea to the injection of Panas' solution into the anterior chamber. He also cites 4 cases of glaucoma after extraction. WERNER.

In FREYER'S (209) case the patient was in apparently good health and condition, though 75 years old. Two hours and a half after extraction, according to Graefe, hemorrhage set in, presumably from the stump of the iris, which continued for many hours, leading to atrophy of the globe. BURNETT.

HOTZ (210) reports two cases of sudden excessive hemorrhage immediately after cataract extraction, expelling the vitreous and leading to atrophy of the ball. No cause could be assigned. BURNETT.

Ever since, in 1884, MCKEOWN (211) tried the removal of cataract by intraocular injections he operates both ripe and unripe cataracts in the same way and with such good results that he now even extracts lenses which still permit of the passage of light, the fundus being still visible, and the patients able to go about without difficulty. Among 100 cataracts in all stages of maturity 81 were uncomplicated, 5 complicated, and 14 traumatic. In 8 cases there was escape of vitreous, slight except in 1 case ; in 2 it took place during injection. Panophthalmitis ensued in 3 cases, but could not be attributed to the injection. In 5 cases there was severe iritis, and in 3 irido-cyclitis. Vision in 13 still very immature cataracts : equalled 0.5 Sn in 6 cases, 0.8 Sn in 1, small prin- in 1, 1.75 Sn in 2, 2.25 Sn in in 1, counting figures in 2 (there had been iritis). The injected liquid was pure warm water. Panas' solution and Wecker's eserine solution were not found to possess any advantages. The force which must be exerted to remove these masses of cortex is not dangerous. Small syringes with small canulas are insufficient. Iridectomy was performed only in cases of unripe cataract. WERNER.

MCKEOWN (212) presents an illustration and description of the

syringe which he uses in washing out the anterior chamber in extraction. MARCKWORT.

KNAPP'S (213) statistics of 1,000 cases, extend from 1866 to 1886, and were all made according to Graefe, or a slight modification thereof. There are 8 series of cases, with the percentages given in each, and the special form of section and modification of operation employed. Beginning with the very peripheral Jacobson incision, he ended with the circular marginal incision of de Wecker. Excision of a piece of the anterior capsule was tried, but abandoned for the peripheral incision. In the 8., 9. and 10. hundred the operation was done under antiseptic precautions. The percentage of loss varied from 11.5 % in the 4. and 5. to 2 % in the 2. and 8. The average loss was 6.3 %, and of these 4.2 % were from suppuration. The average good vision was 85.4 %, the moderate 8.3 %. Many important practical deductions from a study of so large a number of cases are given, among others that suppuration does not always start from the cornea, but may begin in the iris, capsule, or vitreous. BURNETT.

MEYER (214) describes a case of lenticonus posterior in the right eye of a boy aged 10. By transmitted light it appeared as a funnel or cone, slightly reflecting light, with the base at the posterior surface of the lens. Thence it projected far into the vitreous. The cone itself is completely transparent, but its surface shows numerous spots, the largest of which lies near the apex of the cone. Meyer thinks that the lenticonus is not the result of an anomaly of development or formation, but of a pathological process. Only three cases have been published thus far (Webster, v. d. Laan and Placido, and Becker).

PANAS (216) has performed during the last four years 460 extractions without iridectomy and with irrigation of the anterior chamber. In only thirty cases iridectomy became necessary, either at once or after the operation. In 437 cases the result was good, in 21 not satisfactory; 2 were lost by suppuration, and in 23 the iris was caught in the wound. Panas injects only a very small quantity of a solution of biniodide of mercury (1:20,000), just enough to sterilize any germs which may have entered with the instrument or air bubbles. In 101 cases he washed out the anterior chamber with a 4 % solution of boracic acid to remove remnants of lens matter. Plastic iritis occurred about the same number of times after the application of either remedy.

V. MITTELSTÄDT.

RANDALL (218) claims that he can make the Graefe section much better with the "Holschnitt" knife of v. Jaeger than with the narrow knife of v. Graefe. BURNETT.

SECONDI (219) advocates artificial ripening of cataract by friction of the cortex, which he performs with a squint-hook. In 16 cases of unripe cataract treated in this manner the extraction (small flap upward) was perfectly successful. The author does not limit himself to any particular length of time which should elapse between the two operations; in unripe, senile cataracts a few days are sufficient, while in some cases friction and extraction can be performed at the same sitting. DANTONE.

A girl aged 15 was operated by WESTHOFF (220), on account of punctate congenital cataract, by division and removal of the swollen lens masses, through an incision with a lance-shaped knife. After a walk of an hour and a half over a snow-field illumined by the sun, she complained that every thing seemed red; at night every thing appeared blood-red. The pupil was round, of medium width. When she closes the eyes every thing appears green. The following day no improvement. With the aphakial eye she recognizes all the colors of Holmgren's worsteds, but calls white pink. With $+13+2^{c}v=5\frac{5}{6}$. Three months later, when snow had again fallen, the same phenomenon. The youthful age, the round pupil, and the power to recognize colors through the red haze, are rare. An explanation is as yet impossible, but the indications point to hyper-irritation of the retinal elements sensitive to red. WESTHOFF.

XVII.—VITREOUS.

221. ZIEMINSKI. Apoplexie générale du corps vitré chez les adolescents. *Rec. d'ophth.*, Jan. 17, 1888.

ZIEMINSKI (221) discusses the spontaneous hemorrhages into the vitreous during youth, basing his observations on cases seen by himself. Besides hypertrophy of the heart, retention and putrid decomposition of the fæces, giving rise to a change in the blood, may frequently become the cause. This auto-intoxication of the organism, the scoretæmia (Flint), is in the majority of cases the real cause of the intraocular hemorrhage at this time of life (??). MARCKWORT.

XVIII.—RETINA AND FUNCTIONAL DISTURBANCES.

222. BETTREMIEUX, P. Est-il prouvé que l'iridectomie est impuissante au décollement de la rétine? *Arch. d'ophth.*, vol. i., p. 43.

223. V. DER BURG, C. L. On retinitis miasmatica. De Geneesheer in Nederlandsch Indie, 2. deel., Batavia, 1887.

224. BURNETT, SWAN M. Clinical contributions to the study of ring scotoma. *Trans. Amer. Ophth. Soc.*, 1887.

225. CAUDRON. Le coup de soleil électrique. *Rev. génér. d'ophth.*, 1888, No. 2, p. 63.

226. CSAPODI. Cases of cured hemianopsia. *Wiener med. Presse*, No. 12, 1888. Report of cases.

227. DOYNE, R. W. Observations on tobacco-amblyopia. *Ophth. Hosp. Rep.*, vol. xii., 1, p. 51.

228. GALEZOWSKI. De la curabilité du décollement de la rétine et de son traitement. *Rec. d'ophth.*, March, 1888, p. 151.

229. HOWE, LUCIEN. Photography of the interior of the eye. *Trans. Amer. Ophth. Soc.*, 1887.

230. LANG-BARRETT. On the frequency of cilio-retinal vessels and of pulsating veins. *Royal Lond. Ophth. Hosp. Rep.*, vol. xii., 1, p. 59.

231. LOPEZ. Amblyopie quinique. *Rec. d'ophth.*, Feb., 1888, p. 79.

232. MITTENDORF, W. F. Transmitted pulsations at the fundus oculi. *Trans. Amer. Ophth. Soc.*, 1887.

233. MARTIN. Pathogénie des ophthalmies électriques. *Congr. d'ophth. de Paris*, 1888.

234. NETTLESHIP, E. Can over-use of the retina cause organic disease of the fundus? *Ophth. Rev.*, 1888, p. 33.

235. NOTHNAGEL. Case of sudden blindness. *Wiener med. Bl.*, 1888, No. 20.

236. NOYES, H. D. Gliosarcoma of the retina; enucleation; no recurrence after 14½ years. *Trans. Amer. Ophth. Soc.*, 1887.

237. NOYES, H. D. Pseudo-glioma from traumatism. *Trans. Amer. Ophth. Soc.*, 1887.

238. PESCHEL. L'amaurosi chinica. *Boll. d'ocul.*, vol. x., 3, and *Ann. di ottalm.*, vol. xvi., 5–6, p. 419.

239. RANDALL, B. A. Cilio-retinal or aberrant vessels. *Trans. Amer. Ophth. Soc.*, 1887.

240. ROOSA, D. B. ST. J. A case of amaurosis after the administration of large doses of quinine; recovery. *Trans. Amer. Ophth. Soc.*, 1887.

241. SAMELSOHN, J. On blindness after inflammatory blepharospasm. *Zeh. klin. Monatsbl.*, vol. xxvi., p. 221, and *Berl. klin. Wochenschr.*, No. 4, Jan. 23, 1888.

242. DE SCHWEINITZ, G. E. A case of leucæmic retinitis. *Amer. Jour. Ophth.*, April, 1888.

243. SEGUIN, E. C. A second clinical study of hemianopsia. Cases of chiasm-lesion. Demonstration of hemiopic pupillary inaction. *Jour. of Nerv. and Ment. Diseases*, Nov.–Dec. 1887.

244. SILEX, P. Two cases of so-called coloboma of the macula lutea. *Arch. f. Augenhk.*, vol. xviii., p. 289. These ARCH., XVIII., No. 1.

245. SILEX, P. Temporary amaurosis due to blepharospasm, with some remarks on the sight of new-born children. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxvi., p. 104.

246. STANDISH, MYLES. A case of retinitis pigmentosa treated electrically. *Trans. Amer. Ophth. Soc.*, 1887.

247. TERRIER, FELIX. De l'ophthalmie électrique. *Arch. d'ophth.*, vol. viii., Jan.–Feb., No. 1, p. 1.

248. THEOBALD, SAML. A case of recurrent retinal hemorrhages, followed by the outgrowth of numerous blood-vessels from the optic disc into the vitreous humor. *Trans. Amer. Ophth. Soc.*, 1887.

249. THOMPSON, J. L. Is it ever justifiable to provoke premature labor for restoration of sight in albuminuric retinitis? *N. Y. Med. Rec.*, March 3, 1888.

250. WADSWORTH, O. F. A case of congenital, zonular, grayish-white opacity around the fovea. *Trans. Amer. Ophth. Soc.*, 1887.

251. WADSWORTH, O. F. Detachment of the retina in both eyes, with albuminuria of pregnancy; replacement of the retina. *Trans. Amer. Ophth. Soc.*, 1887.

252. ZIEGLER, E. Contribution to the knowledge of the development of amaurosis after loss of blood. Contributions to pathological anatomy and physiology, by Prof. Ziegler and Nauwerk, vol. ii., 1888.

BETTREMIEUX (222) takes exception to the remark of Coppéy, that iridectomy is useless in preventing detachment of the retina, and to decide the question recommends to try the operation in cases in which one eye has already become blind from this cause,

while the other is threatened. In 15 such cases, in which the initial symptoms had been noticed, iridectomy was performed, and detachment has thus far not taken place. In 37 cases of progressive myopia, with diminution of vision and opacities of the vitreous, the iridectomy produced a marked improvement of the condition. The author thinks that the iridectomy overcomes the disturbances of circulation, to which he attributes the detachment, in which, in opposition to the usually accepted belief, the tension is at first increased, just as detachment of the retina is sometimes followed by glaucoma. V. MITTELSTÄDT.

V. D. BURG (223) describes a miasmatic retinitis. The patients shun the light and frequently suffer with megrim. Field of vision not contracted. The sight has diminished. The pupils are narrow, but react promptly. The retina is more red than normal, but dull, the papilla indistinct. The arteries are contracted, the veins engorged. There was always an improvement after quinine.

WESTHOFF.

BURNETT (224) gives the histories in full of two typical cases of this affection which he followed and examined at short intervals for ten years. There were no ophthalmoscopic appearances which corresponded to the subjective symptoms, and from a study of these cases and from the data furnished by a study of the distribution of the nerve fibres in the optic nerve, chiasma, and tract, the author concludes that the phenomenon is due to a circumscribed affection of the bundle of nerve fibres at some part of their course. Seventeen diagrams accompany the histories, showing the changes occurring at different periods of its course of the disease. BURNETT.

DOYNE (227) reports a case of monocular central tobacco-amblyopia in a man aged thirty-eight. V L = $\frac{6}{6}$; R = $\frac{6}{36}$; central scotoma for red and green, the papilla hyperæmic. Five months later, during which time he had abstained from tobacco, the scotoma had disappeared. V = $\frac{6}{9}$. Tobacco was again allowed. He adds the report of another case, in which he found the usual central scotoma on one eye, and a ring-scotoma for red with central scotoma on the other. V improved under an occluding bandage, which was applied on the supposition that tobacco exerts a toxic, destructive effect on the retinal purple, and that light should therefore be shut out. Doyne found in this form of tobacco-amblyopia about the patient a peculiar dry and fusty odor, such as is not generally observed in smokers. WERNER.

GALEZOWSKI (228) reports some cases of detachment of the retina treated with puncture and aspiration, some of which he claims to have cured. (No exact data are given to show whether the cured cases were kept under observation for a longer period of time.—Rev.). MARCKWORT.

HOWE (229) showed some photographs he had taken of the fun dus oculi, giving the formula for the erythrosine solution which enables red to be photographed with great ease. BURNETT.

LANG and BARRETT (230) found in 8 cases among 48 children (16.7 %) distinct cilio-retinal vessels, doubtful in 3 (6.3 %). Among 61 persons, most of them of youthful age, venous pulsation was observed in 45, or 73 %, after the instillation of homatropine or cocaine, doubtful in 9, or 14.8 %. WERNER.

LOPEZ (231) describes a case of quinine blindness. The patient had taken in one day 20 grms of sulphate of quinine, and was blind and deaf the next day. Hearing soon returned, but sight only imperfectly. When Lopez saw the patient vision had risen in both eyes again to $\frac{20}{30}$, but the visual field was very much contracted, scarcely extending beyond the point of fixation upward ; in the other directions between 10° and 18°. The papilla appeared gray, and arteries were pale and could be followed only about 1 PD beyond the discs. The patient could recognize all colors, except that he sometimes took green for gray and violet for blue. MARCKWORT.

In MITTENDORF'S (232) case a small band of connective tissue united one retinal vein with another and showed vibrations synchronous with the heart-beats, even when the pulsations were not visible in the vessels themselves. Vision was normal.

BURNETT.

MARTIN (233) thinks that the affection of the eyes produced by the electric light is not due to the chemical, but to the light rays. Patients blinded by the sun, snow, etc., present a similar condition, the cause being sought here, not in the chemical, but in the light rays. Bravais holds the opposite opinion. MARCKWORT.

NETTLESHIP (234) has investigated the question whether certain forms of retinal and choroidal affection of the macula can be ascribed to over-exertion of the eyes or to too intense illumination. Numerous observations of this kind of cases in which only one eye was affected, or one more than the other, seem to speak for the correctness of this view. WERNER.

NOTHNAGEL (235) saw sudden amblyopia (hemiablepsia supe-

rior) develop in an otherwise healthy man aged forty-six. The fundus was normal and the pupils responded promptly to light. As there were no other symptoms, he is inclined to seek the cause in a lesion in the cortex of the occipital lobe, which in one case he could demonstrate by the post-mortem.

NOYES (236) gives the further history of a case in which he enucleated an eye fourteen and a half years previously, and which on examination proved to be affected with gliosarcoma. There was up to that time no return in the orbit or elsewhere. He also mentions another case in which eight years had elapsed since removal without return. BURNETT.

NOYES (237) relates the history of a case of injury of the orbital edge, in which some time after V was found lost in the eye on the same side. The left eye showed a yellowish mass in the retina, the nature of which was doubtful. An enucleation was made from prudential motives and the mass found to be an inflammatory exudation. BURNETT.

PESCHEL (238) observed quinine amaurosis in a young woman, which developed in six days after the patient had taken in all four grms of quinine. Total amaurosis lasted only a few hours, while the deafness which had set in at the same time did not disappear until after two days. The ophthalmoscope revealed intense ischæmia of the retina. Improvement gradually took place, but the patient did not recover entirely. Nine months later V was again normal, but the visual field still contracted. DANTONE.

RANDALL (239) reports and figures quite a number of cilio-retinal vessels and gives one drawing of the microscopic appearance of a specimen. He has found those of larger size almost invariably associated with the underlying conus. They are not only not confined to the macular region, but some give off branches to the different quadrants. BURNETT.

ROOSA'S (240) case was that of a young man who had had malarial fever, and while suffering under a convulsive seizure had injections into the rectum of thirty grains of quinine, twice or three times. On coming out of the convulsions on the third day V was lost and the conjunctiva red, the pupils dilated. When seen later by Dr. R. the papillæ were white and some of the vessels very small. Hypodermic injections of strychnine were given, and V gradually improved to perfect restoration. BURNETT.

SAMELSOHN (241) presents an analysis of five cases of blindness in children from blepharospasm, two of which closely resemble

the well-known ones of v. Graefe. In a third child aged four the first qualitative perception of light was noticed on the third day after the lids were opened, but there was marked right-sided hemianopsia. This disappeared with the exception of a defect in the temporal lower quadrant of the right eye. In the last two observations the anatomical cause of blindness was in one distinct atrophy, in the other glaucomatous atrophy with excavation of the papilla.

The patient of DE SCHWEINITZ (242) showed the typical appearances of leucæmic retinitis, and the diagnosis of leucæmia was confirmed by an examination of the blood. BURNETT.

The hemiopic pupillary inaction referred to and demonstrated by SEGUIN (243) is that first pointed out by v. Graefe and more fully described by Wernicke, in which there is no response by the pupil when a fine beam of light is thrown through the pupil on the anæsthetic part of the retina. The cases reported are as follows: Case I.—Loss of V in left, temporal hemianopsia with right; complete atrophy of left optic nerve, partial of right; no other symptoms of cerebral lesion. Hemiopic pupillary inaction. Case II.—Partial blindness, with marked atrophy of both optic nerves, bi-temporal hemianopsia plus obscuration of upper nasal quadrant of left field. No other symptoms of cerebral disease. Hemiopic inaction of right eye. Case III.—Almost total loss of vision in right, temporal hemianopsia with left partial atrophy of both optic nerves. Distinct hemiopic pupillary inaction. No symptoms of cerebral disease. All these conditions the author deems due to chiasm lesion. BURNETT.

SILEX (244) observed amaurosis lasting twelve days in a child two and three quarter years old suffering with scrofula. It had kept the eyes closed for twelve weeks on account of superficial inflammation of the cornea. The fundus appeared normal. Sight returned in thirteen days. The author thinks the disturbance of sight was due to an affection of the visual centre, and is inclined to consider it cortical blindness.

STANDISH (246) reports a case of typical retinitis pigmentosa treated with the constant current alone, in which V increased in the left from $\frac{1}{60}$ to $\frac{1}{15}$, in the right from $\frac{1}{40}$ to $\frac{1}{30}$, and the visual fields from 20° concentrically to 75° horizontally in the right and 70° in the left, and to 70° vertically in the right and to 68° in the left. Dr. Derby, of Boston, also reported a case of improvement by electrical treatment. BURNETT.

TERRIER (247) describes the clinical symptoms produced by the influence of electric light upon the eye, basing his remarks on his own observations and those of others. The disease affects people who attend to the electric illuminating apparatus, or who use the electric flame in soldering, and who have exposed themselves at close range to the electric light without the necessary precautions. But even spectators in electric workshops may be injured, though they may have stood 5–10 metres away from the light. Severe cases begin with symptoms of retinal irritation, scotomas, and subjective perception of colors, followed a few hours afterwards by an intolerable sensation of foreign bodies in the eye, accompanied with severe pains in the eyes and head, and intense photophobia. The conjunctiva is much injected, especially around the cornea, the pupil narrow, lachrymation profuse. In milder cases all these symptoms are much less marked. The prognosis is good, as recovery takes place in a few days; in one case, however, neuroretinitis was observed in the eye which was alone affected. The skin of the face is also affected, as in sunstroke, becoming red and painful. As the author in his case found the conjunctival injection confined to the opening of the palpebral fissure, he considers the ocular symptoms a local insolation akin to those of the skin, but which manifest themselves in the eye in a much severer manner. It is still doubtful which are the active rays. The heat rays may be excluded, and to test the ultraviolet rays, experiments would have to be made with uranium-colored glasses. The light rays are probably the active ones, as the affection is but very mild when they are guarded against.

v. MITTELSTÄDT.

The growth into the vitreous in THEOBALD'S (248) case was from the optic nerve, and consisted of a mass of small blood-vessels held together by a semi-opaque tissue. It was flame-like in form. The author is inclined to the opinion that it is an effort of nature to clear away the debris of the numerous hemorrhages.

BURNETT.

THOMPSON (249) answers the question in the affirmative, and reports one case where it was successfully done, and another in which the patient succumbed to the disease before premature labor could be induced. BURNETT.

WADSWORTH (250) reports a case of grayish-white opacity around the fovea, similar to the cases reported by Magnus, Goldzieher, and Knapp, in a child eleven months old. The child was

apparently well-nourished, but was unable to sit or stand, or even hold her head up. She was said never to cry ; took no notice of any thing, though the face was sufficiently intelligent-looking. Vision evidently imperfect. The macular reflex described by Magnus was lacking in her case. The discs were lacking in fine vessels, and the central vessels were rather small.

BURNETT.

In addition to the unusual accident of detachment in WADSWORTH'S (251) case, there were extensive choroidal changes. Induction of premature labor, which was decided upon, was forestalled by an abortion, which relieved the patient.

BURNETT.

ZIEGLER'S (252) case of amaurosis after loss of blood was that of a woman who became totally blind after a hemorrhage into the stomach three weeks before her death. The ophthalmoscope showed the edges of the papilla indistinct, the arteries thin, the veins tortuous, while the microscope showed fatty degeneration of the retina and optic nerve. Ziegler ascribes these changes to ischæmic degeneration, which may become localized at an earlier or later period in the optic nerve, and this explains the more rapid or slower development of the visual disturbances. The paper is preceded by a detailed review of the literature of the subject.

XIX.—OPTIC NERVE.

253. ENGEL. Case of cysticercus cellulosæ in man—a contribution to the diagnosis of cysticercus cerebri. *Prager med. Wochenschr.*, 1888, No. 2.

254. EMRYS-Jones, A. Atrophy of the optic nerves associated with dropping fluid from the nostril. *Ophth. Rev.*, April, 1888, p. 97.

255. EWETZKY. Atrophy of the optic nerve, with normal sight and a minimum visual field. *Medic. Obosvenie*, vol. xxix., 8.

256. LAWSON, G. Retro-ocular tumor of the optic nerve ; removal of the eye with the tumor ; pathological report. *Royal Lond. Ophth. Hosp. Rep.*, vol. xii., 1.

257. RUMSCHEWITSCH. Some cases of normal vision in which there was marked atrophy of the optic nerve. *Russkaya Med.*, 1888, No. 11.

258. RANDALL, B. A. Coloboma of the optic nerve and sheath. *Trans. Amer. Ophth. Soc.*, 1887.

259. SIMI. Sulla cromatopsia retinica nelle atrofie papillari. *Bull. d'ocul.*, vol. x., 1, 2.

In ENGEL's (253) case the diagnosis of cysticercus cerebri could be made from the double optic neuritis and the appearance of numerous cysticercus cysts under the skin and in the muscles. The cerebral symptoms could therefore be explained by a similar intracranial invasion.

EMRYS–JONES (254) reports the case of an engineer sixty-five years old who for twelve years had suffered with a serous discharge, especially from the left nostril. It occurred only during the day, amounted to at least 15 grms per hour, and entirely ceased at night. There was nothing abnormal about the mucous membrane of the nose, and the sense of smell was preserved, though not acute. Vision of the left eye had sunken considerably during the last three years, even when the discharge had diminished, and proved to be only equal to counting fingers in the outer part of the visual field. The latter was contracted in every direction, the optic nerve was plainly atrophic. Vision of right eye $\frac{20}{20}$, color-perception normal, visual field concentrically limited, papilla pale and atrophic. The chemical composition of the liquid was the same as that in the case observed by Priestley–Smith, reaction alkaline, specific gravity = 1035, no sugar, a large amount of chlorides, traces of sulphur salts ; in the spectroscope the line of seroluteine was visible. The atrophy in this case was certainly not due to a preceding neuritis, and this observation agreed with previous ones in the fact that the discharge took place from the nostril corresponding to the most affected eye.

WERNER.

EWETZKY's (255) case was that of a tabic syphilitic, in whom the fibres supplying the macula remained intact for a long time (sight and color-perception normal), while the visual field was reduced to a minimum and the nerves became atrophic ; finally, however, these fibres also lost their power.

HIRSCHMANN.

LAWSON's (256) patient, aged twelve, had a retro-bulbar tumor of the optic nerve, which two months previously had caused protrusion of the eye. The latter had deviated downward and inward, and total blindness had suddenly resulted. The papilla was white, its edges were indistinct, the veins tortuous. The eye was removed with the tumor, the latter surrounding the optic nerve entirely, and probably arising from its inner nerve-sheath. Under the microscope it proved to be a sarcoma in process of myxomatous degeneration. WERNER.

RANDALL (258) gives the history with a drawing of one case of coloboma of the optic nerve and of the sheath, and two others of what he deems simple coloboma of the optic nerve, as manifested by nicks or depressions at the edge of the disc. BURNETT.

SIMI (259) has accurately measured the visual field for colors in twenty-five cases of atrophy of the optic nerve, and found that in all of them dyschromatopsia occurred, a fact which, however, cannot be used for the differential diagnosis in the light of present experience. DANTONE.

XX.—INJURIES, FOREIGN BODIES (PARASITES).

260. BICKERTON, T. H. Successful extraction of a piece of glass from an eye where it had lodged for more than ten years. *Brit. Med. Jour.*, April, 1888, p. 896.

261. BICKERTON, T. H. A second successful case of extraction of glass from an eye. *Brit. Med. Jour.*, June, 1888, p. 1215.

262. CAUDRON. Le coup de soleil électrique. *Rev. génér. d'ophth,*. 1888, No. 2, p. 63.

263. v. DOOREMAL, J. C. Een geval van luxatio bulbi. Feestbundel Donders Jubiléum, Amsterdam, 1888, p. 41.

264. FANO. Blessure par instrument piquant et tranchant de la sclérotique avec integrité de la choroide. *Jour. d'ocul. et de chir.*, February, 1888.

265. HIRSCHBERG, J. A case of magnet-extraction, under observation eight years and a half. *Centralbl. f. Augenhk.*, vol. xv., p. 55.

266. MELLINGER, C. On magnet-extractions in the Basel ophthalmic clinic. *Inaug. Diss.*, Basel, 1888.

267. DE VINCENTIIS. Osservazioni di cisticerchi. *Ann. di ottalm.*, vol. xvii., 1, p. 61.

BICKERTON (260) observed new symptoms of irritation, especially after long-continued work, in a young man one of whose eyes had been injured ten years previously by the bursting of a glass retort; sight however had remained quite good. There was a small scar below and to the inner side of the pupil with a delicate adherent leucoma, showing that a foreign body had entered at that point. The lens was quite normal. A small foreign body was observed at the bottom of the anterior chamber, which on extraction proved to be a small piece of glass $4\frac{3}{4}$ *mm* long and 1 *mm* wide. $V = \frac{4}{10}$ (?). WERNER.

BICKERTON (261) also reports another case in which, six years previously, the right eye had been injured by breaking glass, and there had been at times severe irritation. An iridectomy was of no benefit, until, finally, a small piece of glass was discovered at the bottom of the anterior chamber, after the removal of which all the symptoms of irritation ceased. It weighed 13 *ctgrm*, was 6.4 *mm* long and 2.7 *mm* wide. WERNER.

CAUDRON (262) reports the case of a patient who, in the morning, had made experiments on the liquefaction of metal with electricity, his eyes being protected by dark glasses. He removed them for a moment to see whether the flames were passing through the metal. During the day he did not notice any thing peculiar about his eyes, but at night they began to burn, run water, and finally he was totally unable to open them. He had very severe pain, and called upon Meyer during the night, who instilled cocaine. He thereupon opened his eyes, and Meyer found the conjunctiva of the lids red, while the cornea and ocular conjunctiva were not affected; the pupil was very narrow, vision intact. Two days later the eye had completely recovered.

MARCKWORT.

DOOREMAL'S (263) patient, a butcher, fell with his upper lid upon a hook. The latter was rudely removed, dislocating the globe, and the lids closed behind it. He held both his hands before his eyes, perceived a bright light, and complained of its brightness. Under chloroform the outer canthus was cut, the lids were drawn forward with a strabismus hook and a spoon, and the eyeball replaced. The wound was sutured and both eyes were bandaged. The patient had photophobia for some time. Full vision was restored. WESTHOFF.

HIRSCHBERG (265) presented a very successful case of extraction with a magnet of a chip of iron weighing 20 *mgr*. Vision was normal eight and a half years later, with the exception of the small defect in the visual field due to the operation. Hirschberg justly calls attention to the fact that, when the vitreous has been injured, the final visual result cannot be ascertained until after the lapse of two years. He also briefly mentions two other cases with relatively good result.

MELLINGER (266) reports on twelve magnet-extractions performed at the Basel University ophthalmic clinic, in seven of which the operation was successful, while in five it failed. In one case good sight, in another moderate sight, was preserved; in

four the shape of the eyeball was preserved, while in one the eye had to be removed immediately afterwards. The author warns against seeking the foreign body in the vitreous with the magnet.

XXI.—OCULAR AFFECTIONS IN CONSTITUTIONAL DISEASES.

268. ALEXANDER (Breslau). Ocular affection from fish-poisoning. *Breslauer ärztl. Zeitschr.*, 1888, No. 3.

269. ALLEMAN, L. A. W. The papillitis of sunstroke. *N. Y. Med. Jour.*, May 5, 1888.

270. BADAL. Contribution à l'étude des cécités psychiques. Alexie, agraphie, hémianopsie inférieure, trouble du sens de l'espace. *Arch. d'ophth.*, vol. viii., No. 2, March–April, 1888, p. 97.

271. BEAUNIS. Sur le nystagmus expérimental d'origine cérébrale. *Gaz. hebd.*, 1888, p. 92. *Soc. de biol.*, Feb. 4, 1888.

272. BRUNS, L. A case of dyslexia (Berlin), with disturbance of writing. *Neurol. Centralbl.*, 1888, Nos. 2 and 3.

273. V. D. BURG. On geophagia. De Geneesheer in Nederlandsch Indie, 1887, 2 Deel, Batavia.

274. COLBURN, J. E. A case of epilepsy cured (apparently) by the correction of an error of refraction. *Jour. Amer. Med. Assoc.*, Feb. 18, 1888.

275. GALEZOWSKI. Des symptomes initiaux d'ataxie locomotrice et en particulier de la paralysie d'accommodation. *Rec. d'ophth.*, 1888, p. 85.

276. GRADDY, L. B. A clinical study of snow-blindness. *Trans. Nebr. State Med. Assoc.*, 1887.

277. HOWE, LUCIEN. Note on the increase of blindness in the United States. *Trans. Amer. Ophth. Soc.*, 1887.

278. LANDOLT, E. De la cécité verbale. Lésion isolée de l'image visuelle du mot, dissémination possible des centres visuels graphiques et moteurs dans les deux hémisphères, localisation corticale du sens chromatique. Feestbundel Donders Jubiléum, Amsterdam, 1888, p. 419.

279. MOORE, W. O. Diabetic affections of the eye. *N. Y. Med. Jour.*, March 31, 1888.

280. NOTHNAGEL. Tumor of the corpora quadrigemina; hydrocephalus; Escape of cerebral fluid through the nose. *Wiener med. Bl.*, 1888, Nos. 6–8.

281. OLIVER, C. A. Description of a case of coloboma of the iris, lens, and choroid, with a study of the visual fields. *Trans. Amer. Ophth. Soc.*, 1887.

282. OLIVER, C. A. The eye of the adult imbecile. *Trans. Amer. Ophth. Soc.*, 1887.

283. POOLEY. T. R. The induction of premature labor in amaurosis and amblyopia in connection with the albuminuria of pregnancy. *N. Y. Med. Rec.*, Jan. 28, 1888.

284. PUTZEL, L. A case of cortical hemianopsia. *N. Y. Med. Rec.*, June 2, 1888.

285. RAMPOLDI. Caso grave di ottalmodinia quarito all' antipyrina. *Ann. di ottalm.*, vol. xvii., 1, p. 58.

286. SCHMALL, B. The retinal circulation, especially the arterial pulse in the retina in constitutional diseases. With 12 wood-cuts. *v. Graefe's Arch. f. Ophth.*, vol. xxxiv., 1, p. 37.

287. SIMERLING, E. Case of gummous affection of the base of the brain involving the chiasma. A contribution to the knowledge of the course of the fibres in the optical conducting apparatus. *Arch. f. Psychiatr.*, vol. xix., 2.

288. SPALDING, J. A. Is vision ever permanently affected by sunstroke? *Med. Rec.*, April 28, 1888.

289. V. D. STOK. Hemiplegia, aphasia en hemiopia by een geval van morbilli. *Nederl. Militair Geneeskundig Archief*, vol. xi., 3 Ed., 1887.

ALEXANDER (268) presented a patient who became affected with paresis of both oculomotors, the abducent and trochlearis nerve, after partaking of decomposing herrings, and under symptoms closely resembling those of atropine-poisoning. The power of convergence, however, was preserved, which would indicate that the centre of convergence is separate from the centres governing the lateral movements of the eye. Complete recovery ensued.

ALLEMAN'S (269) patient was a blacksmith aged 28. Overcome by the heat of his furnace, he was affected with slight numbness of the left side of his body and impaired vision in the left eye; in this eye there was a papillitis. Right eye normal. The histories of other reported cases are given. BURNETT.

BADAL (270) describes at length a peculiar visual psychical disturbance, which manifested itself during childbed, of a hitherto healthy young woman aged 31, without any hereditary taint.

According to BEAUNIS (271) nystagmus of cerebral origin is either direct or reflex ; the former is monocular and occurs on the side opposite that of the cerebral lesion ; the reflex nystagmus is binocular. MARCKWORT.

BRUNS (272) reports a case of dyslexia (word-blindness, Berlin, "Lesescheu," Nieden), which he observed in a man aged 46, who showed all the symptoms described by Berlin, and in whom the autopsy showed a softening in the right nucleus lentiformis, and in the right capsula interna, besides atheromatous degeneration of most of the larger cerebral arteries. Bruns made further studies on disturbances in writing after copy. While Nieden had already found that there was nothing abnormal about spontaneous writing and after dictation, as Bruns did also, he found that when writing after copy the patient showed symptoms of disinclination similar to those observed in reading, and probably ascribable to the same cause. In regard to the seat of the affection in the right cerebral hemisphere, the statement of Berlin was found to be true, according to which the symptom of dyslexia cannot be directly utilized in locating cerebral lesions.

V. D. BURG (273) discusses geophagia, the eating of ampoh (edible earth) and coal-slate, and reports that the miners on Borneo become cachectic from its continued consumption, while the following symptoms develop in the eyes : deep injection, the sclera becomes blue ; a chalky, firmly adherent secretion is discharged from the conjunctiva, the cornea becomes dull ; the pupil irregular, sluggish. Two weeks later severe chemosis and corneal ulcers, iritis and anterior synechiæ with hypopyon, finally staphyloma of the cornea. WESTHOFF.

COLBURN'S (274) patient was a man 24 years old affected with *petit mal*, and for which he had been unsuccessfully treated medically. He had a manifest H of 0.5D, and a latent H of 2D. He had also an insufficiency of the external recti of 8°, which was overcome by exercise with prisms. +2D were ordered for constant use, and the attacks ceased. BURNETT.

GRADDY (276) shows that the part played by the retinal affection in snow-blindness has been immensely exaggerated. The retina is exhausted, but this is entirely inadequate to account for the important symptoms of the trouble, namely : severe pain and photophobia, and, in neglected cases, corneal ulcers and panophthalmitis. These can only be explained by a primary corneal lesion, and these the author has found in such cases as he has seen soon after

the beginning of the trouble, in the shape of a horizontal strip of superficial keratitis and conjunctivitis corresponding to the lid-fissure. In short, the important feature in the complex known as snow-blindness is a sun-burn of the cornea and conjunctiva, and this may form the starting-point for very serious trouble.

BURNETT.

HOWE (277) finds that while the population of the United States has increased 30.09 per cent. from 1870 to 1880, blindness has increased 140.78 per cent. He also finds, from an examination of the census returns that the number of blind varies in different sections of the country. In the Northern States there are 7.9 blind in every 10,000, in the Middle States 9.42, in the Southern States 10.81, in the Eastern States 10.34, in the Middle States (?) 7.90, and in the Western States 5.68. On motion a committee, composed of Dr. Howe as chairman, with Drs. Andrews and Burnett, was appointed to examine and report on the causes of preventable blindness in the United States.

BURNETT.

LANDOLT (278) describes three cases of word-blindness, the first of which is interesting on account of the incomplete left-sided hemiplegia connected with it, and the absolute absence of color-perception in the hemianopic portion. In a fourth case, observed by Dr. Verrey, the autopsy could be performed. During life there had been dyslexia, with absolute right-sided hemichromatopsia and diminution of the light-sense and vision on the same side of both retinæ. He found an old hemorrhagic cyst in the lower part of the left occipital lobe, indicating that here the chromatic centre must be sought, perhaps in the posterior part of the plica lingualis and fusiformis. WESTHOFF.

MOORE (279) gives a very complete survey of the eye-affections occurring in diabetes, illustrated by the histories of twenty-one cases. From his conclusions we extract the following: Cataracts may be extracted from diabetes, if the patient is previously treated for the general disease. Diabetic retinitis is usually associated with hemorrhages into the vitreous. Diabetic amblyopia is usually associated with central scotoma for red and green, and occurs independently of amblyopia from tobacco and alcohol. All diabetic affections of the eye are the result of poor nutrition produced by the disturbance of the glycogenic function.

BURNETT.

NOTHNAGEL (280) describes an interesting case of hydrocepha-

lus internus, which began four years ago after a fall upon the head, had developed to a marked degree, and had caused the escape of the liquid in the subarachnoid space through the eye and from one of the nostrils. The quantity of this liquid was about one and one half to two litres. The autopsy showed that it had passed down in the perineural sheaths of the atrophic olfactory passages. The final cause of the hydrocephalus proved to be a tumor of the corpora quadrigemina. The principal symptoms of the cerebral affection were amaurosis, nystagmus, anosmia, and an ataxic walk.

OLIVER's (281) patient was a woman twenty years of age, and the defect was essentially the same in both eyes. Central color-perception was good. The visual fields for white and colors were much narrowed in an almond shape. Central vision much reduced. Diagrams of the condition of iris, choroid, and lens are given. BURNETT.

The results of OLIVER's (282) paper are based on an examination of twenty young male imbecile adults at the State Hospital for the Insane at Norristown, Pa. He believes that the deficiencies of vision among imbeciles are due to intellectual hebetude more than to any organic anomaly, and that it is an organ which shows but little of the signs of overwork which we find in those who use their eyes much, such as insufficiency of the interni, irregularity of physiological excavation, increase in density and thickness of retinal fibres, absorbing conuses in all their variety, etc. BURNETT.

POOLEY (283), besides relating in more or less detail the histories of other reported cases, gives two of his own, one in which premature labor was induced, and one in which it was not. In the one in which abortion was resorted to, the improvement in the ocular symptoms was immediate and the full visual function restored. He thinks that in uræmic amaurosis, even when there are no changes visible with the ophthalmoscope, the induction of premature labor is indicated, and is demanded when there are pronounced neuro-retinal changes. BURNETT.

PUTZEL's (284) patient was a man fifty-four years old. He had right hemianopsia, and his visual hallucinations were confined exclusively to the right visual field. The autopsy showed the cortex to be normal, with the exception of the left cuneus. This was yellowish, was boggy to the feel, and contained a serous cyst in its interior. The lesion was limited entirely to the cuneus, except that it crossed the calcarine fissure. BURNETT.

SCHMALL (286) presents a very interesting and careful study of the retinal circulation, and especially the arterial pulse in constitutional affections, illustrating it with clinical histories and pulse-curves. He examined especially the condition of the retinal blood-vessels: 1, in diseases of the heart and blood-vessels; 2, in fevers and 3, in anæmic disturbance. Without entering upon any details, it may be stated that Schmall agrees with Leber that in diseases leading to engorgement in the major circulation the blood-vessels of the eye, and especially the veins, do not participate to any extent, and in such cases in which this was observed there was probably a predisposition. In valvular affections, however, the arterial anæmia of the retina is marked. Among 38 such cases Schmall found arterial pulse in 11, and always (8 cases) in insufficiency of the aortic valves, while he saw it only twice among 22 cases of mitral affection, and once in a case of total synechia pericardialis, with dilatation of both sides of the heart. The locomotion of the arterial trunk observed at times was very remarkable. In febrile conditions Schmall found more or less marked hyperæmia of the whole vascular system, as v. Jaeger did before him. In typhoid fever, however, in opposition to Jaeger, he found a great difference in calibre and color between the arteries and veins; one case especially was of interest, in which the engorged veins collapsed when the patient sat up, while the arteries only slightly contracted. In regard to anæmia, Schmall examined 55 cases of chlorosis, 38 after profuse hemorrhage, severe febrile affections, etc., and found in 20 per cent. of those suffering with chlorosis nothing abnormal in the blood-vessels of the fundus, while in 80 per cent. there were changes, usually affecting both veins and arteries to the same extent. Schmall could not verify the statement of Raehlmann that in anæmic persons there was marked hyperæmia of the retina, nor could he observe greater tortuosity of the retinal arteries; neither does he think that the arterial pulse is due to hydræmia, as Raehlmann would have it, as the latter has not taken the important factor of "cardiac weakness" sufficiently into account.

SIMERLING (287) presents a detailed clinical history, with autopsy, of a case of gumma of the base of the brain, implicating the chiasma, the clinical symptoms being right-sided temporal hemianopsia and left-sided amaurosis. For details, see the original.

SPALDING (288) is of the opinion that insolation rarely affects

the vision permanently, and if so the atrophy of the nerve occurs within a few months, and not, as pension claimants assert, after several years. BURNETT.

V. D. STOK (289) observed sudden, complete, right-sided hemiplegia, aphasia, and nasal hemianopsia of the left eye in a young man aged twenty, after the disappearance of the rash of measles. To explain these symptoms, he assumes a hemorrhage or exudation near the fossa Sylvii, at the point where it is crossed by the optic nerve, simultaneously with pressure upon the centre of speech in the third gyrus. The patient recovered under the use of iodine and nourishing food. WESTHOFF.

REVIEWS.

The Journal of Ophthalmology, Otology, and Laryngology, issued quarterly. GEO. S. NORTON, M.D., Editor; CHAS. DEADY, M.D., Assistant Editor. A. L. Chatterton & Co., 78 Maiden Lane, New York.

1. The first (January) number of this periodical, 110 pages, without illustrations, but well printed on heavy paper, presents a very good appearance and promises to become a valuable magazine of work done in its department. We welcome it so much the more as it intends to collect the researches, experience, and opinions of our homœopathic brethren, which thus far have scarcely been accessible to the medical profession at large. "The editors, though earnestly believing in the law of similars as a law of cure, more fully recognize the fact that affections of these special organs are more often only amenable to surgical or mechanical interference than to medicinal measures." The need of the new periodical is set forth by the editors as follows: "One now naturally inquires: Are there not already too many journals devoted to the eye, ear, and throat? We do not deny that there are many, perhaps too many, but among the whole number there is not one in which an article treating upon homœopathic therapeutics could be admitted." . . . "It is proposed to fill the pages of this journal chiefly with original articles." . . . "Abstracts will occasionally be made of articles of particular importance in diagnosis, pathology, and therapeutics, which may from time to time appear in American or foreign periodicals, but no attempt will be made to give a résumé of the progress of ophthalmology, otology, and laryngology." This their programme is very well carried out in the first number, which contains nineteen original articles (abstracts of which will appear in our systematic report), some of considerable,

others of doubtful, value, and some, in our opinion, might as well have remained unpublished. To the latter class belong the two papers on homœopathic therapeutics, in which the conscious or unconscious disregard of the natural course of disease is as conspicuous as the orthodoxy of the specific creed. On page 100, to mention but one example, are related two cases of paralysis of accommodation after diphtheria. "I prescribed causticum without benefit, and one week later gave Duboisin 6x, with rapid improvement, and entire cure in a short time." The homœopathic remedy in 6x, as every physician knows, or ought to know, did exactly the same thing as nature does in every similar case without any medicine. H. K.

2. Francis Valk, **Lectures on the Errors of Refraction and Their Correction with Glasses.** New York, G. P. Putnam's Sons, 1889. Price $3.00. A well-gotten-up volume of 241 pages and 89 engravings in the text. The subjects of the different lectures are as follows: I. Anatomy of the Eye, 17 pages; II. Refraction, 25 pages; III.—V. Emmetropia, Hypermetropia, Myopia; VI. Ophthalmoscopy; VII. Muscular Asthenopia; VIII. Astigmatism; IX. Retinoscopy; X. Presbyopia; XI. Illustrative Cases. The book, clear and elementary, adapting itself to the ophthalmologically untutored mind, "is offered to the general profession as a simple and complete method for the diagnosis and correction of all the errors of refraction." It is a valuable guide especially for those who, in post-graduate schools or at ophthalmic institutions, want to devote more attention to this class of anomalies than is furnished at the ordinary college curriculum. H. K.

3. Dr. Alexander (Aachen, Germany), **Syphilis und Auge** (Syphilis and the Eye). From Personal Observations. Wiesbaden, I. F. Bergmann, 1888 and 1889. A well written, very readable, and highly instructive monograph of 234 pages, which though based on personal experience—for the acquisition of which the author is particularly well situated, Aix-La-Chapelle being one of the most renowned European watering-places for syphilitic diseases,—yet exhaustively utilizes the literature on the subject. *Contents:* Initial sclerosis, gumma, and rupia-ulcers of the eyelids. Tarsitis and conjunctivitis syphilitica. Gumma of the conjunctiva. Periostitis of the orbital walls and subsequent optic neuritis and neuro-paralytic keratitis. Caries and gumma of the orbit. Syphilitic disease of the tear-duct. Keratitis parenchymatosa and punctata. Gumma corneæ. Scleritis gummosa. Plastic

and gummous iritis. Gumma of the ciliary body. Choreiditis syphilitica disseminata, areolaris, and diffusa. Syph. retinitis. Central recurrent retinitis. The syphilitic diseases of the optic nerve. Dependence of tabes on syphilis. The affections of the ocular muscles and nerves resulting from syphilis are very extensively described, as well as the heredito-syphilitic eye-diseases. The last chapter is on the general treatment of the syphilitic affections of the eye.

From this large list of subjects it is clear that Dr. Alexander's monograph will be welcome to every ophthalmologist, who will not only read it with interest and great profit, but will use it also as a book of reference for a group of diseases which, though very important, are as yet insufficiently described. We recommend the nicely printed volume to all oculists that know German, and to those that don't we take this opportunity of drawing their attention to the admirable "Manual on Syphilis," by JONATHAN HUTCHINSON (London and Philadelphia, 1888), which treats of the syphilitic affections of the eye very thoroughly. This, of course, was to be expected from a man who contributed more than any other to our knowledge of syphilitic eye-diseases.

H. K.

MISCELLANEOUS NEWS.

FRANCIS CORNELIUS DONDERS died at Utrecht March 24, 1889, at the age of seventy-one years. With this announcement we wish, to-day, only to express our deep sorrow at the loss of a man who left one of the brightest names in the history of ophthalmology. A necrologue is in preparation for our next issue.

Dr. W. FLETCHER WILSON, of Denver, Col., died April 19, 1889, from an overdose of morphine, which, by mistake, he took to relieve his insomnia. He was a well-informed and painstaking student, and a very competent and successful eye and ear surgeon.

Fig. I.

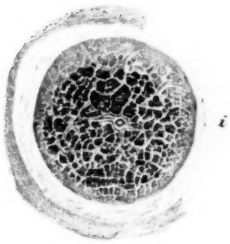
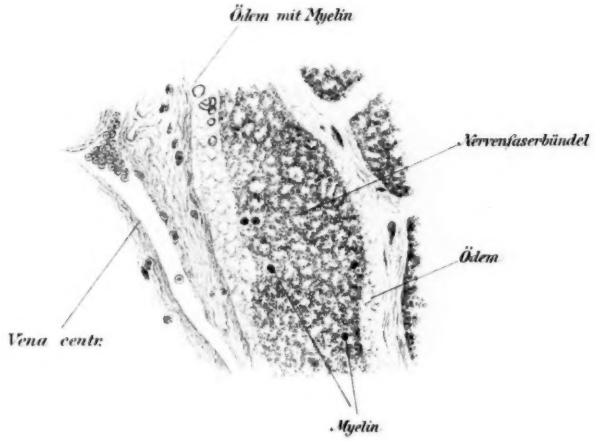


Fig. II.

Fig. III.



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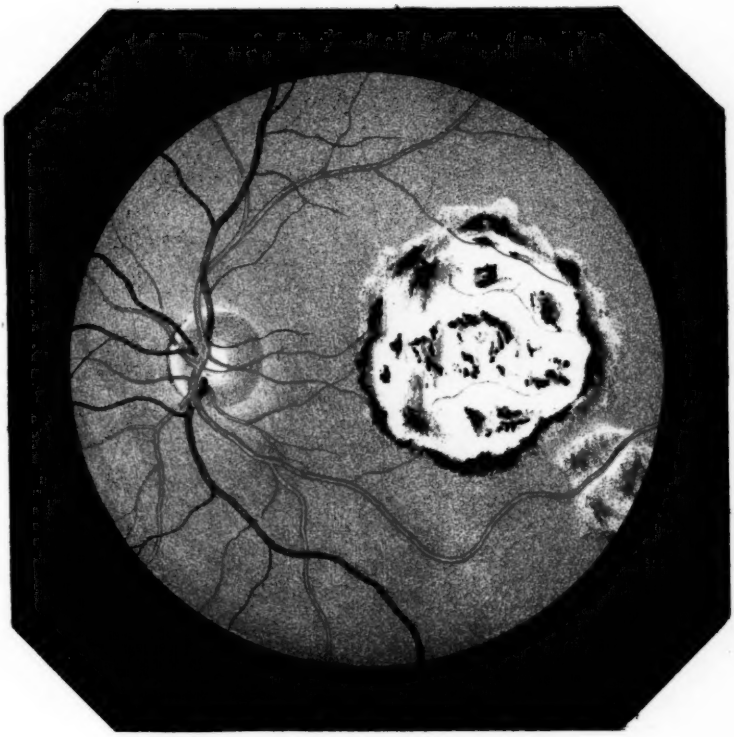

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